

# EMISSION & OCCUPIED BANDWIDTH

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST DESCRIPTION

5.2GHz band

FCC KDB 789033 General UNII Test Procedures were followed.

The transmit frequencies and data rates listed in the datasheet were measured in each band utilized by the radio. A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input.

The spectrum analyzer settings were as follows:

- RBW = Approx. 1% of the emission bandwidth (B).
- VBW = > RBW
- Detector = Peak
- Trace mode = max hold

The spectrum analyzer occupied bandwidth measurement function was then used to measure 26 dB emission bandwidth.

There is no required limit to be met in the rule part for the 5.2GHz band. The purpose of the test is to both report the results as required by the KDB, and to utilize the emission bandwidth for setting the channel power integration bandwidth during conducted output power testing.

5.8GHz band

FCC KDB 789033 General UNII Test Procedures were followed to measure the minimum emission bandwidth for the 5.725-5.85 GHz band.

The transmit frequencies and data rates listed in the datasheet were measured in each band utilized by the radio. The transmit power was set to its default maximum.

A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input.

The spectrum analyzer settings were as follows:

- RBW = 100 kHz
- VBW =  $\geq 3 \times$  RBW
- Detector = Peak
- Trace mode = max hold

The spectrum analyzer occupied bandwidth measurement function was then used to measure 6 dB emission bandwidth.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Spectrum Analyzer	Agilent	N9010A	AFL	9/20/2014	9/20/2015
DC Block, 40 GHz	Fairview Microwave	SD3379	AMM	2/27/2015	2/27/2016
Attenuator, 20dB, 40 GHz	Fairview Microwave	SA4018-20	TQY	2/27/2015	2/27/2016
Signal Generator, 40 GHz	Agilent	N5173B	TIW	7/15/2014	7/15/2017

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EUT:	Firebox T50-W (BS5AE7W)	Work Order:	VDEI0009
Serial Number:	70AF00069-3EB6	Date:	08/04/15
Customer:	WatchGuard Technologies, Inc.	Temperature:	25.7°C
Attendees:	None	Relative Humidity:	43%
Customer Project:	None	Bar. Pressure:	1014 mbar
Tested By:	Jonathan Kiefer	Job Site:	TX09
Power:	110VAC/60Hz	Configuration:	1

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.407:2015	ANSI C63.10:2013

## COMMENTS

2x2 MIMO mode, Chain AB (Chains 0 and 1).

## DEVIATIONS FROM TEST STANDARD

None

## RESULTS

	Value	Limit (>)	Result
Chain A			
802.11(n) HT, MCS0			
80 MHz			
Low Channel 5210 MHz	86.042 MHz	N/A	N/A
Low Channel 5775 MHz	74.19 MHz	500 kHz	Pass
802.11(n) HT, MCS8			
20 MHz			
Low Channel 5180 MHz	22.473 MHz	N/A	N/A
High Channel 5240 MHz	22.527 MHz	N/A	N/A
Low Channel 5745 MHz	17.538 MHz	500 kHz	Pass
Mid Channel 5785 MHz	17.574 MHz	500 kHz	Pass
High Channel 5825 MHz	16.966 MHz	500 kHz	Pass
40 MHz			
Low Channel 5190 MHz	44.603 MHz	N/A	N/A
High Channel 5230 MHz	44.715 MHz	N/A	N/A
Low Channel 5755 MHz	35.062 MHz	500 kHz	Pass
High Channel 5795 MHz	35.754 MHz	500 kHz	Pass
802.11(ac) VHT, MCS8 (256-QAM)			
20 MHz			
Low Channel 5180 MHz	23.216 MHz	N/A	N/A
High Channel 5240 MHz	22.793 MHz	N/A	N/A
Low Channel 5745 MHz	17.542 MHz	500 kHz	Pass
Mid Channel 5785 MHz	17.694 MHz	500 kHz	Pass
High Channel 5825 MHz	17.434 MHz	500 kHz	Pass
802.11(ac) VHT, MCS9 (256-QAM)			
80 MHz			
Low Channel 5210 MHz	93.426 MHz	N/A	N/A
Low Channel 5775 MHz	75.974 MHz	500 kHz	Pass
40 MHz			

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		Value	Limit (>)	Result
	Low Channel 5190 MHz	46.793 MHz	N/A	N/A
	High Channel 5230 MHz	46.768 MHz	N/A	N/A
	Low Channel 5755 MHz	35.925 MHz	500 kHz	Pass
	High Channel 5795 MHz	36.372 MHz	500 kHz	Pass
<b>802.11(n) HT, MCS15</b>				
	<b>20 MHz</b>			
	Low Channel 5180 MHz	24.812 MHz	N/A	N/A
	High Channel 5240 MHz	23.548 MHz	N/A	N/A
	Low Channel 5745 MHz	17.679 MHz	500 kHz	Pass
	Mid Channel 5785 MHz	17.577 MHz	500 kHz	Pass
	High Channel 5825 MHz	17.572 MHz	500 kHz	Pass
	<b>40 MHz</b>			
	Low Channel 5190 MHz	46.074 MHz	N/A	N/A
	High Channel 5230 MHz	45.931 MHz	N/A	N/A
	Low Channel 5755 MHz	35.707 MHz	500 kHz	Pass
	High Channel 5795 MHz	35.851 MHz	500 kHz	Pass
<b>Chain B</b>				
	<b>802.11(n) HT, MCS0</b>			
	<b>80 MHz</b>			
	Low Channel 5210 MHz	84.761 MHz	N/A	N/A
	Low Channel 5775 MHz	75.495 MHz	500 kHz	Pass
	<b>802.11(n) HT, MCS8</b>			
	<b>20 MHz</b>			
	Low Channel 5180 MHz	21.436 MHz	N/A	N/A
	High Channel 5240 MHz	21.502 MHz	N/A	N/A
	Low Channel 5745 MHz	17.618 MHz	500 kHz	Pass
	Mid Channel 5785 MHz	16.542 MHz	500 kHz	Pass
	High Channel 5825 MHz	17.566 MHz	500 kHz	Pass
	<b>40 MHz</b>			
	Low Channel 5190 MHz	44.307 MHz	N/A	N/A
	High Channel 5230 MHz	44.831 MHz	N/A	N/A
	Low Channel 5755 MHz	35.917 MHz	500 kHz	Pass
	High Channel 5795 MHz	35.735 MHz	500 kHz	Pass
	<b>802.11(ac) VHT, MCS8 (256-QAM)</b>			
	<b>20 MHz</b>			
	Low Channel 5180 MHz	22.364 MHz	N/A	N/A
	High Channel 5240 MHz	22.789 MHz	N/A	N/A
	Low Channel 5745 MHz	17.701 MHz	500 kHz	Pass
	Mid Channel 5785 MHz	17.596 MHz	500 kHz	Pass
	High Channel 5825 MHz	17.437 MHz	500 kHz	Pass
	<b>802.11(ac) VHT, MCS9 (256-QAM)</b>			
	<b>80 MHz</b>			
	Low Channel 5210 MHz	92.135 MHz	N/A	N/A
	Low Channel 5775 MHz	76.027 MHz	500 kHz	Pass

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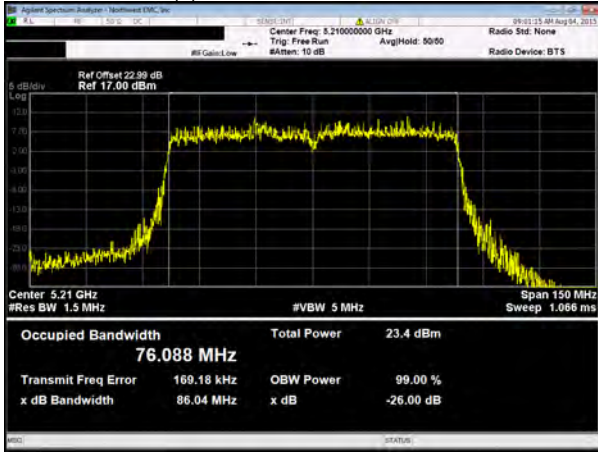
	Value	Limit (>)	Result
<b>40 MHz</b>			
Low Channel 5190 MHz	47.546 MHz	N/A	N/A
High Channel 5230 MHz	45.973 MHz	N/A	N/A
Low Channel 5755 MHz	35.964 MHz	500 kHz	Pass
High Channel 5795 MHz	36.33 MHz	500 kHz	Pass
<b>802.11(n) HT, MCS15</b>			
<b>20 MHz</b>			
Low Channel 5180 MHz	23.166 MHz	N/A	N/A
High Channel 5240 MHz	21.26 MHz	N/A	N/A
Low Channel 5745 MHz	17.648 MHz	500 kHz	Pass
Mid Channel 5785 MHz	17.654 MHz	500 kHz	Pass
High Channel 5825 MHz	17.537 MHz	500 kHz	Pass
<b>40 MHz</b>			
Low Channel 5190 MHz	45.907 MHz	N/A	N/A
High Channel 5230 MHz	46.555 MHz	N/A	N/A
Low Channel 5755 MHz	36.055 MHz	500 kHz	Pass
High Channel 5795 MHz	36.012 MHz	500 kHz	Pass

*Jonathan Kiefer*

Tested By

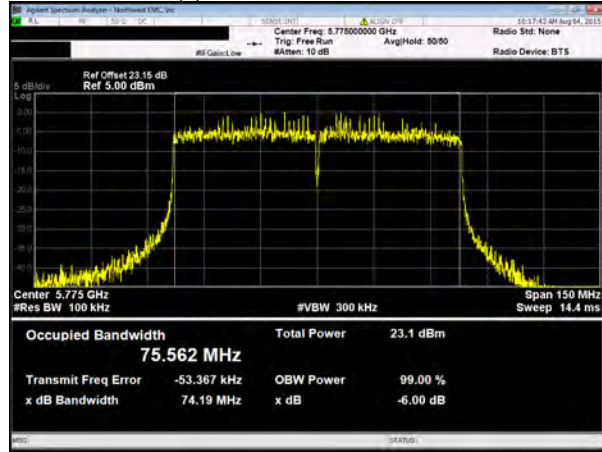
# EMISSION & OCCUPIED BANDWIDTH

Chain A, 802.11(n) HT, MCS0, 80 MHz, Low Channel 5210 MHz



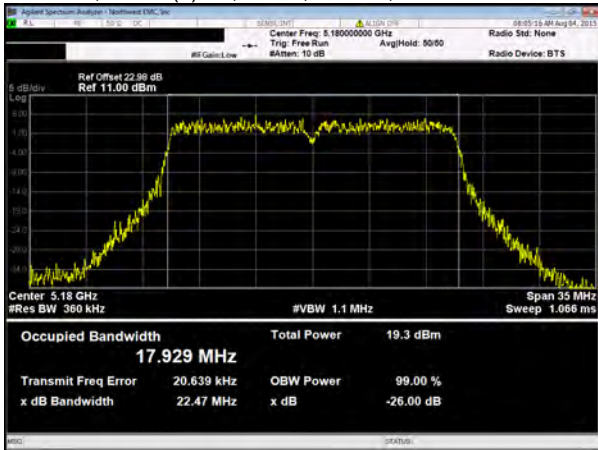
Value	86.042 MHz
Limit (>)	N/A
Result	N/A

Chain A, 802.11(n) HT, MCS0, 80 MHz, Low Channel 5775 MHz



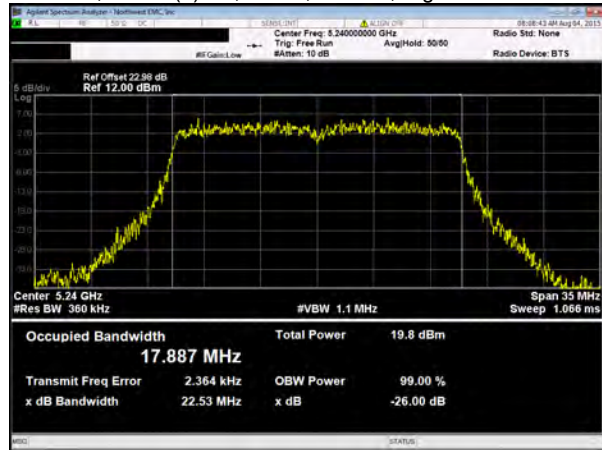
Value	74.19 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(n) HT, MCS8, 20 MHz, Low Channel 5180 MHz



Value	22.473 MHz
Limit (>)	N/A
Result	N/A

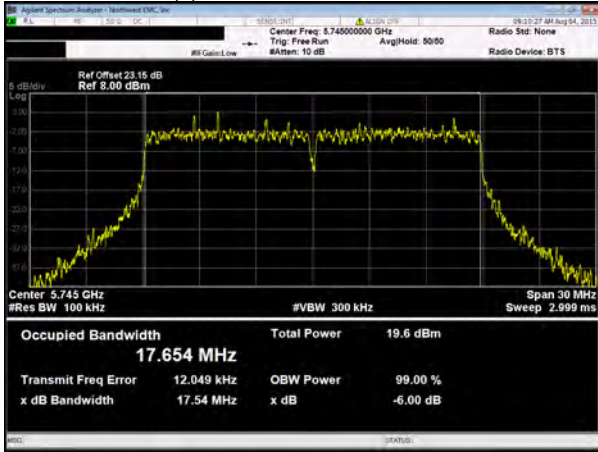
Chain A, 802.11(n) HT, MCS8, 20 MHz, High Channel 5240 MHz



Value	22.527 MHz
Limit (>)	N/A
Result	N/A

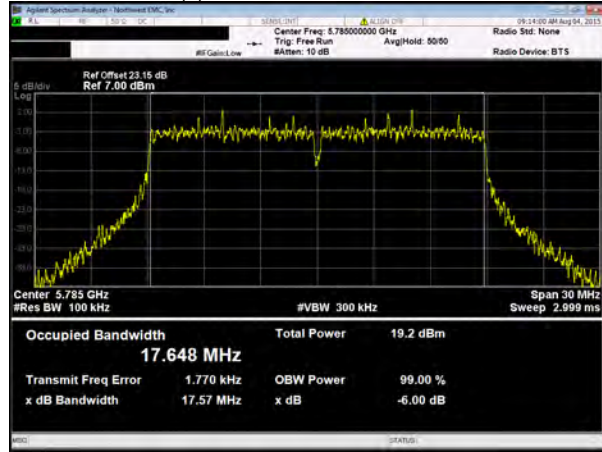
# EMISSION & OCCUPIED BANDWIDTH

Chain A, 802.11(n) HT, MCS8, 20 MHz, Low Channel 5745 MHz



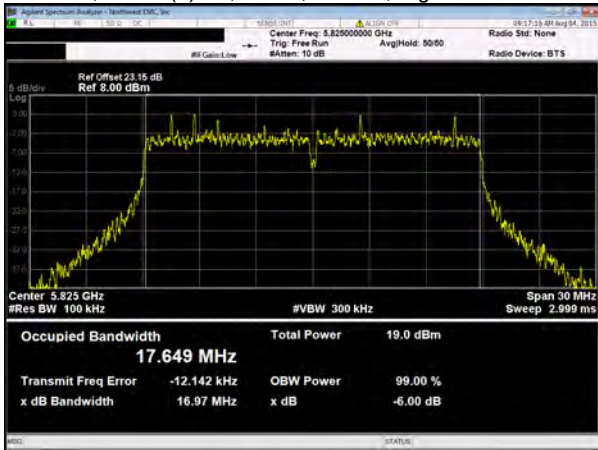
Value	17.538 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(n) HT, MCS8, 20 MHz, Mid Channel 5785 MHz



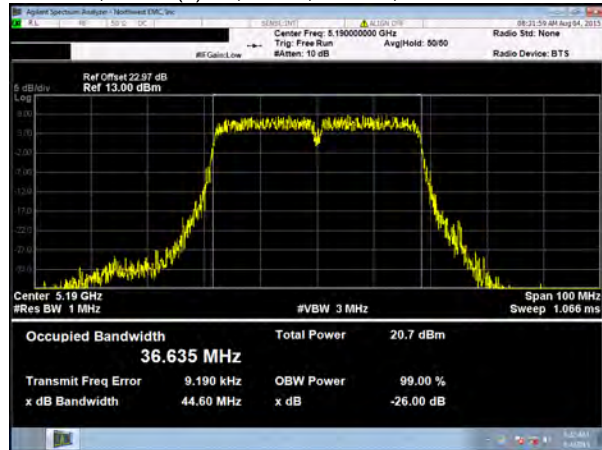
Value	17.574 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(n) HT, MCS8, 20 MHz, High Channel 5825 MHz



Value	16.966 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(n) HT, MCS8, 40 MHz, Low Channel 5190 MHz

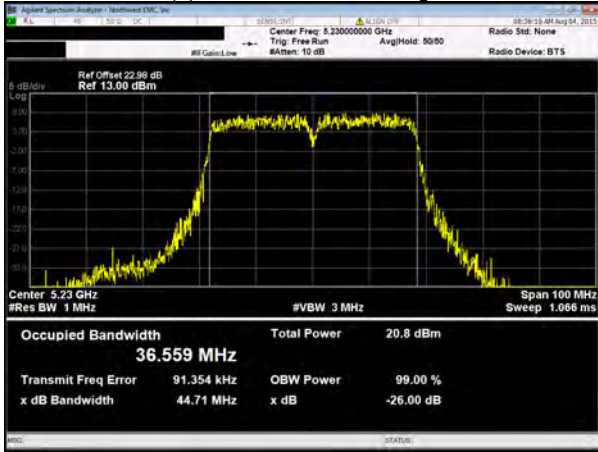


Value	44.603 MHz
Limit (>)	N/A
Result	N/A



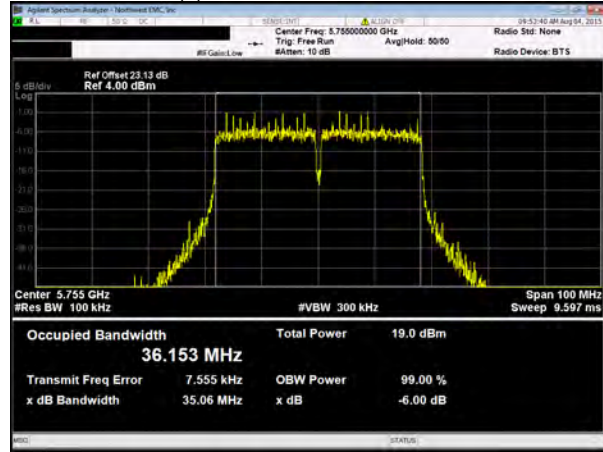
# EMISSION & OCCUPIED BANDWIDTH

Chain A, 802.11(n) HT, MCS8, 40 MHz, High Channel 5230 MHz



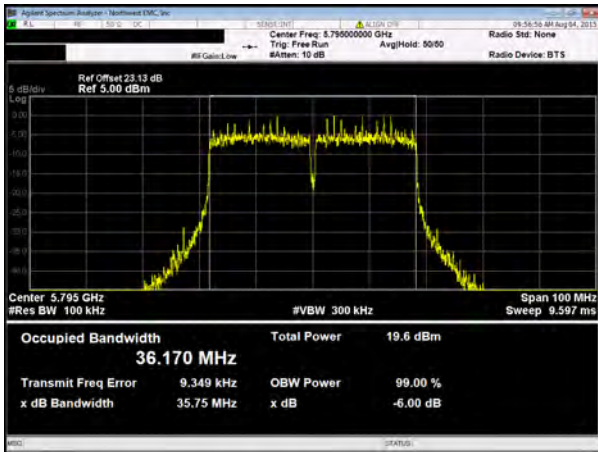
Value	44.715 MHz
Limit (>)	N/A
Result	N/A

Chain A, 802.11(n) HT, MCS8, 40 MHz, Low Channel 5755 MHz



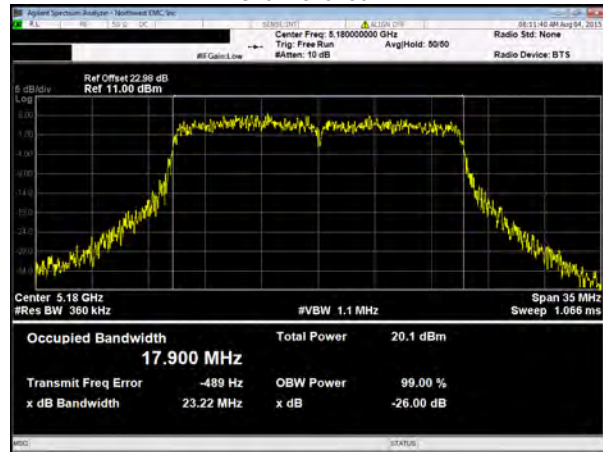
Value	35.062 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(n) HT, MCS8, 40 MHz, High Channel 5795 MHz



Value	35.754 MHz
Limit (>)	500 kHz
Result	Pass

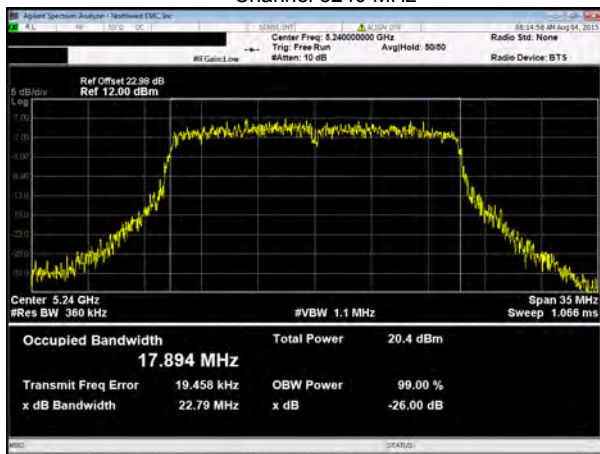
Chain A, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, Low Channel 5180 MHz



Value	23.216 MHz
Limit (>)	N/A
Result	N/A

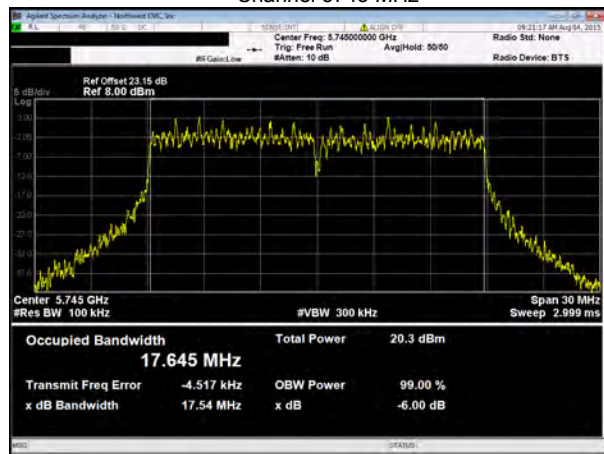
# EMISSION & OCCUPIED BANDWIDTH

Chain A, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, High Channel 5240 MHz



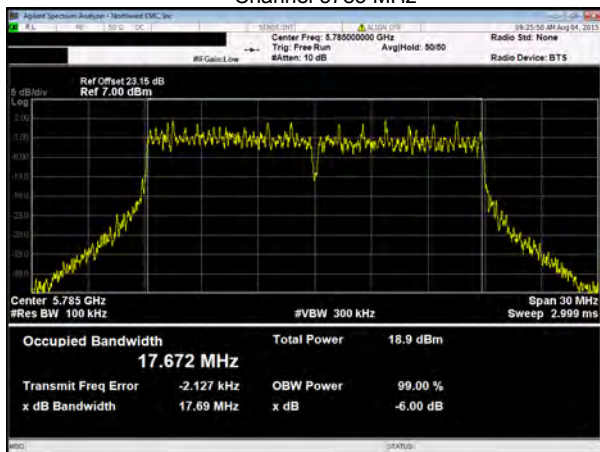
Value	22.793 MHz
Limit (>)	N/A
Result	N/A

Chain A, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, Low Channel 5745 MHz



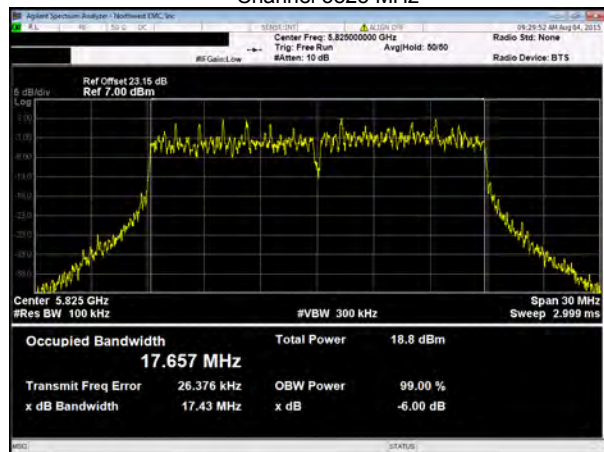
Value	17.542 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, Mid Channel 5785 MHz



Value	17.694 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, High Channel 5825 MHz

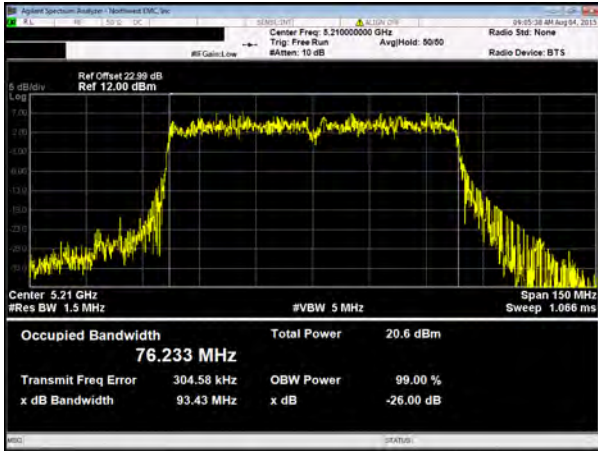


Value	17.434 MHz
Limit (>)	500 kHz
Result	Pass



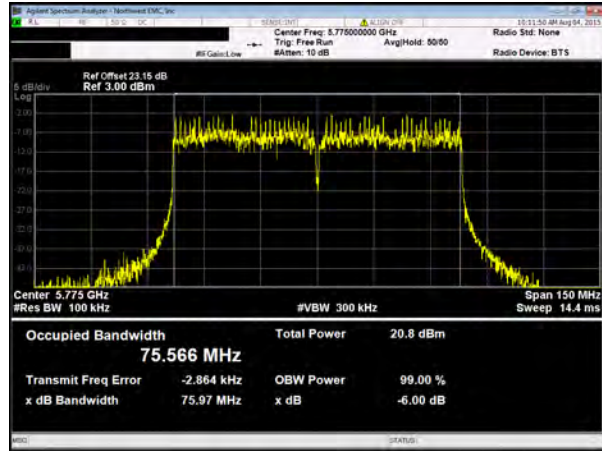
# EMISSION & OCCUPIED BANDWIDTH

Chain A, 802.11(ac) VHT, MCS9 (256-QAM), 80 MHz, Low  
Channel 5210 MHz



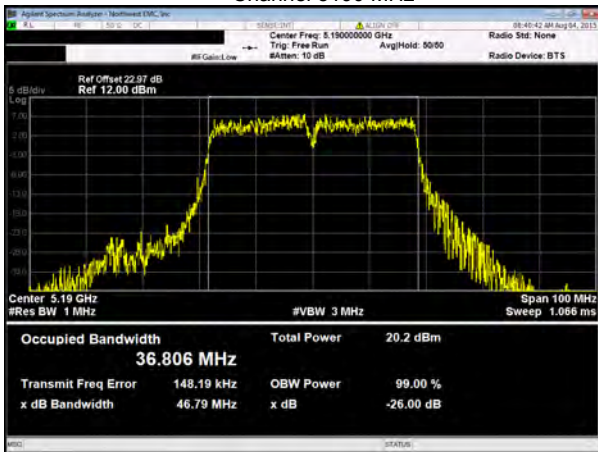
Value	93.426 MHz
Limit (>)	N/A
Result	N/A

Chain A, 802.11(ac) VHT, MCS9 (256-QAM), 80 MHz, Low  
Channel 5775 MHz



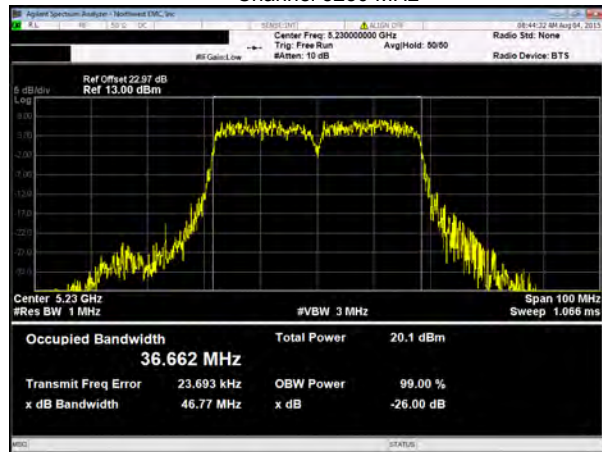
Value	75.974 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, Low  
Channel 5190 MHz



Value	46.793 MHz
Limit (>)	N/A
Result	N/A

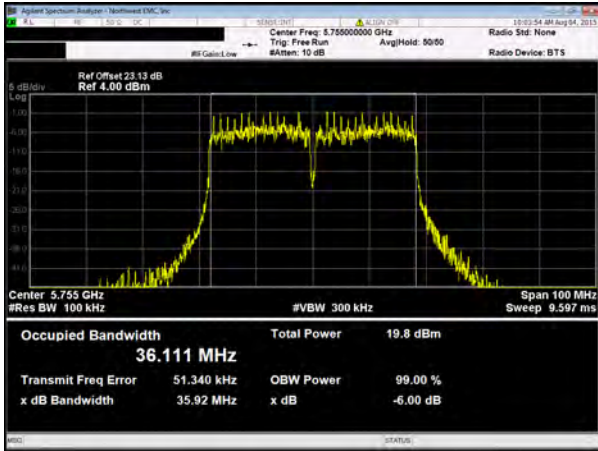
Chain A, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, High  
Channel 5230 MHz



Value	46.768 MHz
Limit (>)	N/A
Result	N/A

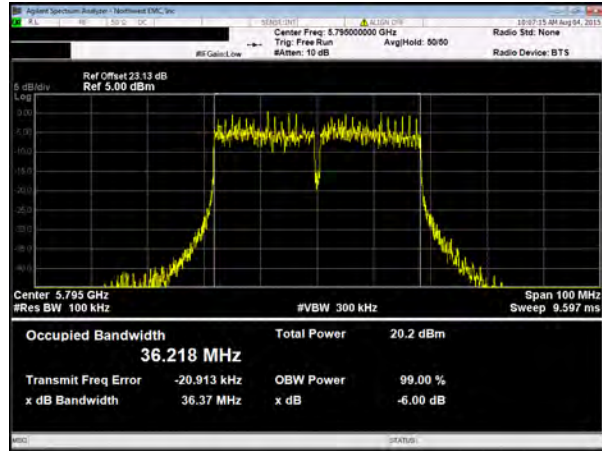
# EMISSION & OCCUPIED BANDWIDTH

Chain A, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, Low Channel 5755 MHz



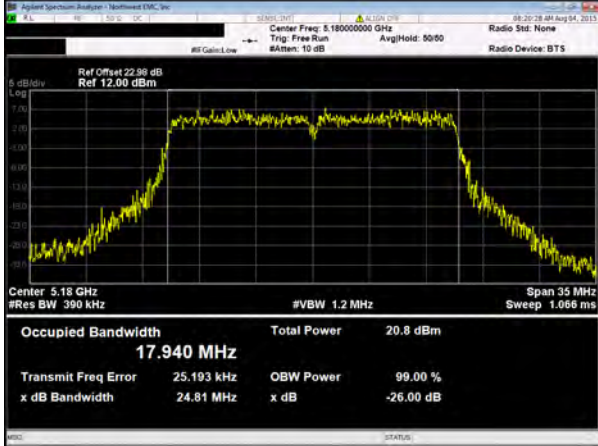
Value	35.925 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, High Channel 5795 MHz



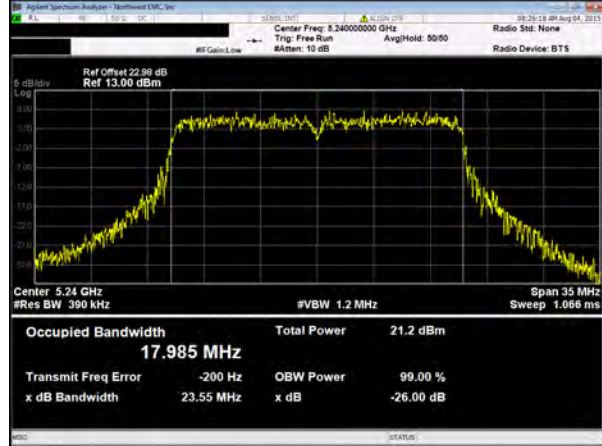
Value	36.372 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(n) HT, MCS15, 20 MHz, Low Channel 5180 MHz



Value	24.812 MHz
Limit (>)	N/A
Result	N/A

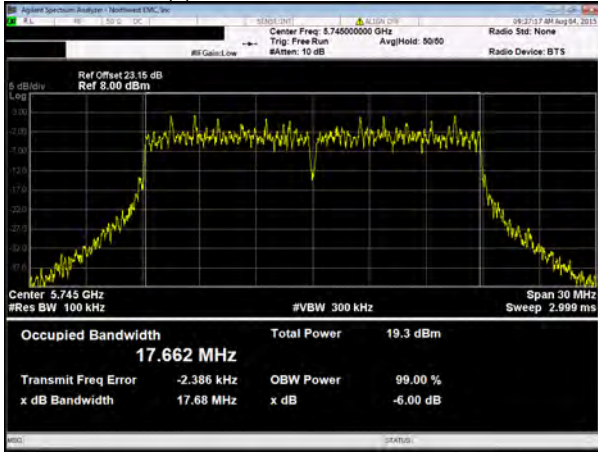
Chain A, 802.11(n) HT, MCS15, 20 MHz, High Channel 5240 MHz



Value	23.548 MHz
Limit (>)	N/A
Result	N/A

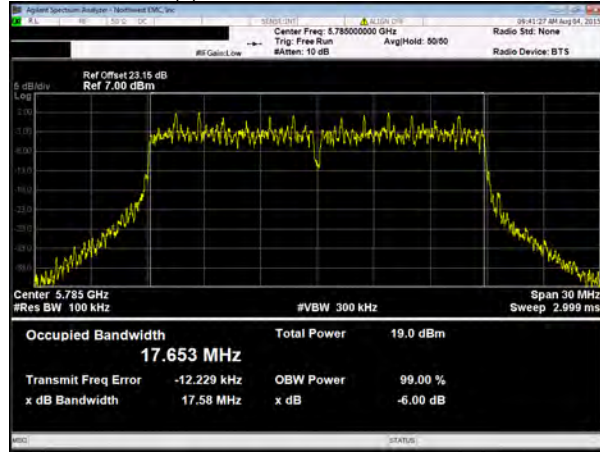
# EMISSION & OCCUPIED BANDWIDTH

Chain A, 802.11(n) HT, MCS15, 20 MHz, Low Channel 5745 MHz



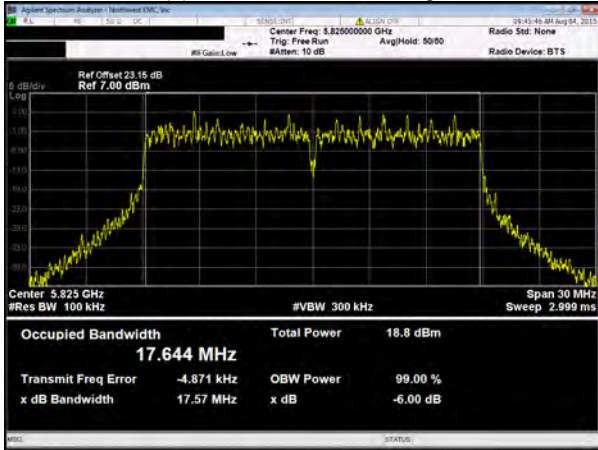
Value	17.679 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(n) HT, MCS15, 20 MHz, Mid Channel 5785 MHz



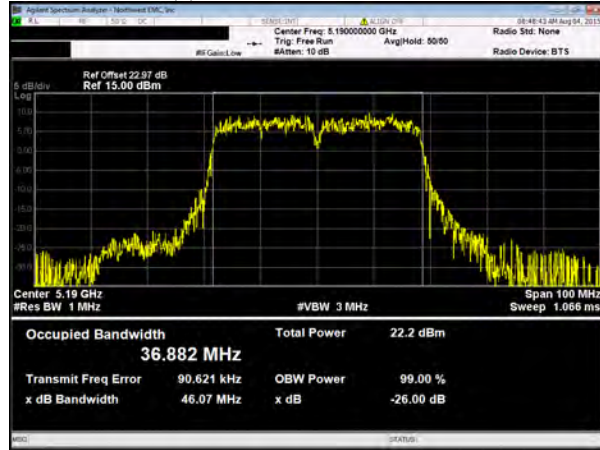
Value	17.577 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(n) HT, MCS15, 20 MHz, High Channel 5825 MHz



Value	17.572 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(n) HT, MCS15, 40 MHz, Low Channel 5190 MHz

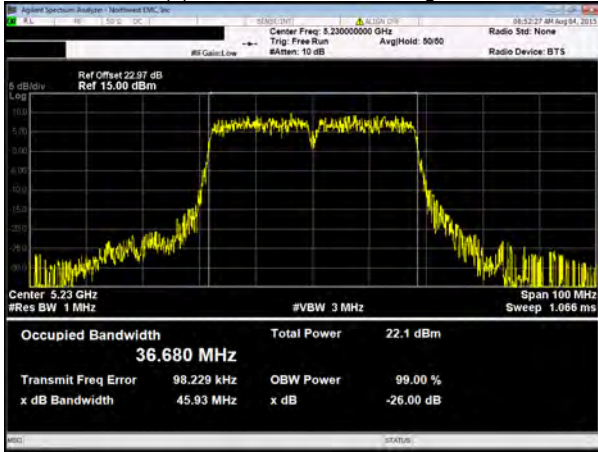


Value	46.074 MHz
Limit (>)	N/A
Result	N/A



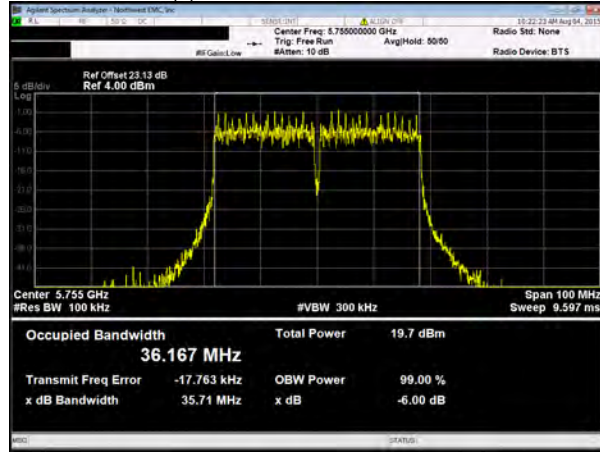
# EMISSION & OCCUPIED BANDWIDTH

Chain A, 802.11(n) HT, MCS15, 40 MHz, High Channel 5230 MHz



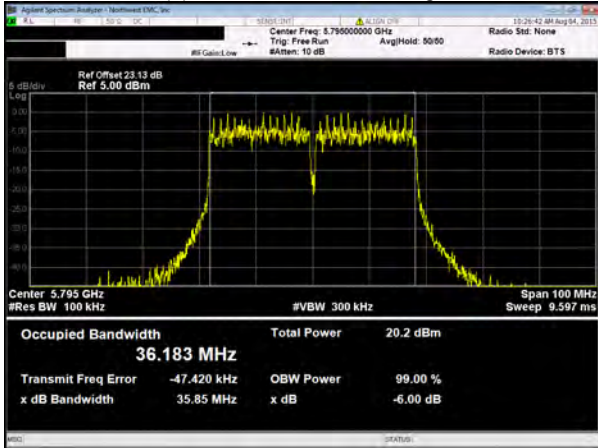
Value	45.931 MHz
Limit (>)	N/A
Result	N/A

Chain A, 802.11(n) HT, MCS15, 40 MHz, Low Channel 5755 MHz



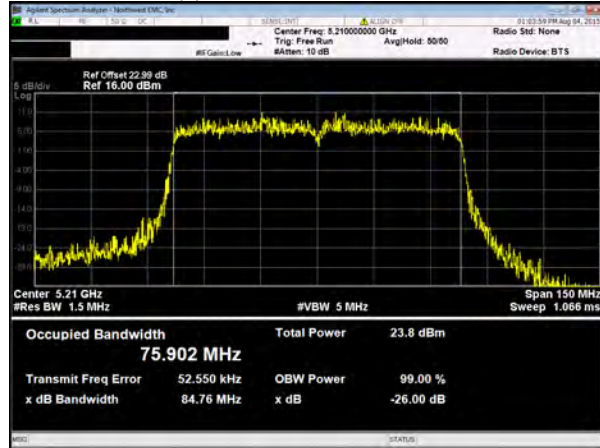
Value	35.707 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(n) HT, MCS15, 40 MHz, High Channel 5795 MHz



Value	35.851 MHz
Limit (>)	500 kHz
Result	Pass

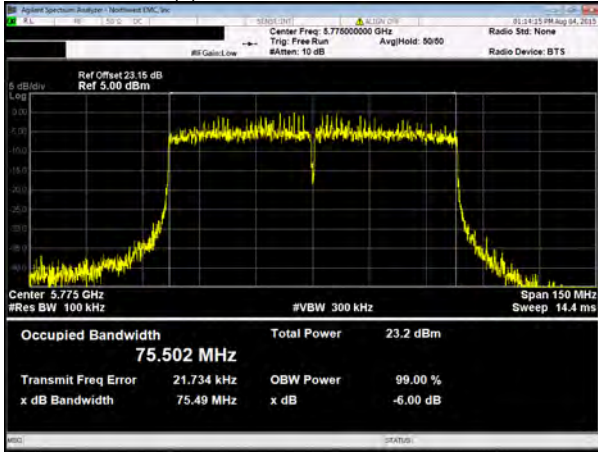
Chain B, 802.11(n) HT, MCS0, 80 MHz, Low Channel 5210 MHz



Value	84.761 MHz
Limit (>)	N/A
Result	N/A

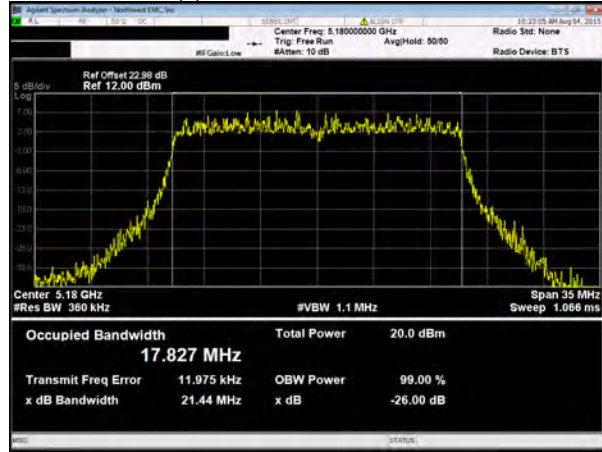
# EMISSION & OCCUPIED BANDWIDTH

Chain B, 802.11(n) HT, MCS0, 80 MHz, Low Channel 5775 MHz



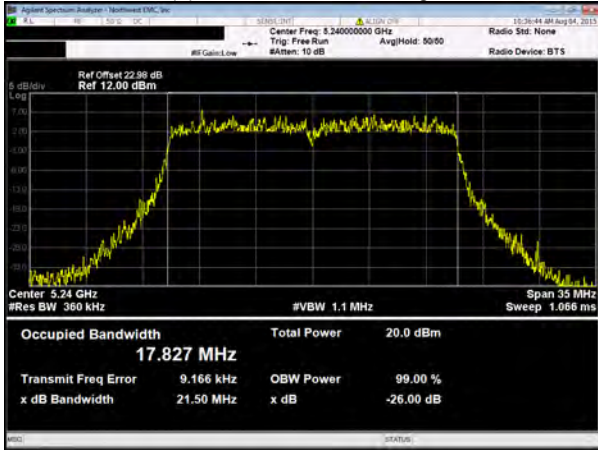
Value	75.495 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(n) HT, MCS8, 20 MHz, Low Channel 5180 MHz



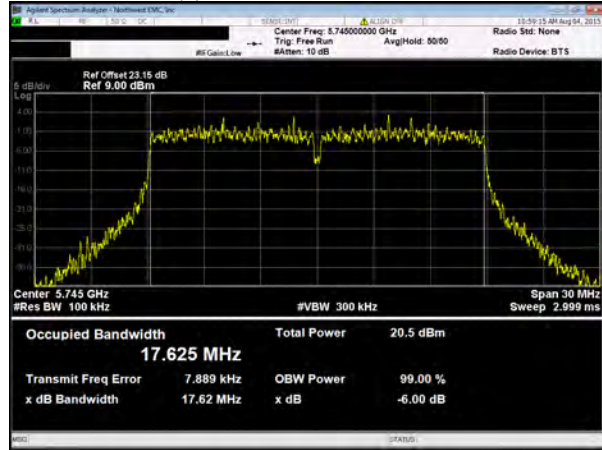
Value	21.436 MHz
Limit (>)	N/A
Result	N/A

Chain B, 802.11(n) HT, MCS8, 20 MHz, High Channel 5240 MHz



Value	21.502 MHz
Limit (>)	N/A
Result	N/A

Chain B, 802.11(n) HT, MCS8, 20 MHz, Low Channel 5745 MHz

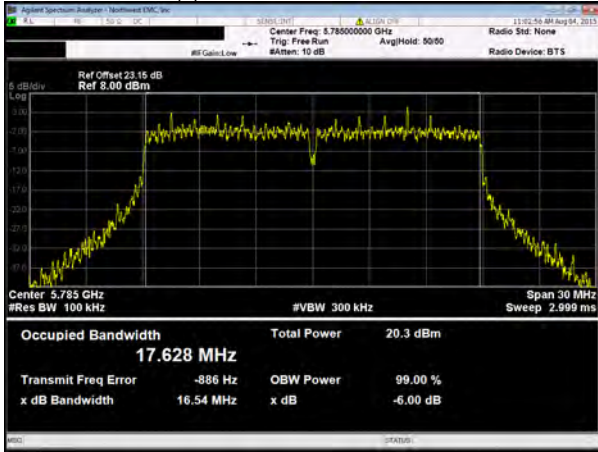


Value	17.618 MHz
Limit (>)	500 kHz
Result	Pass



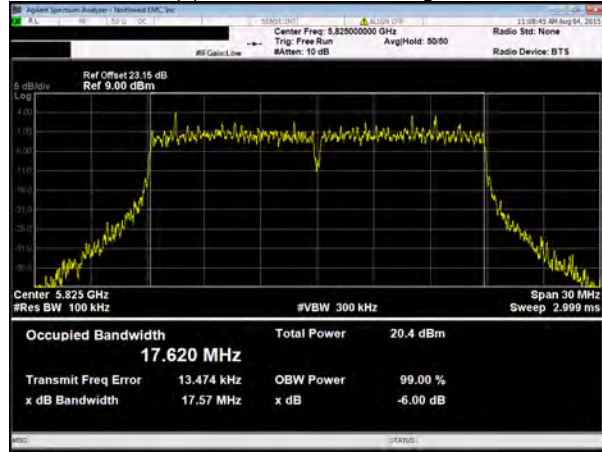
# EMISSION & OCCUPIED BANDWIDTH

Chain B, 802.11(n) HT, MCS8, 20 MHz, Mid Channel 5785 MHz



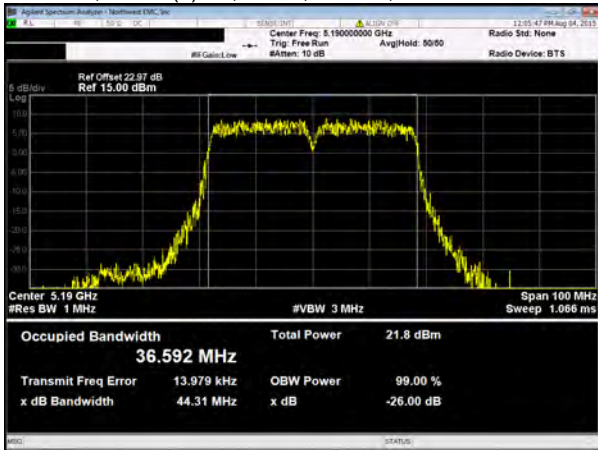
Value	16.542 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(n) HT, MCS8, 20 MHz, High Channel 5825 MHz



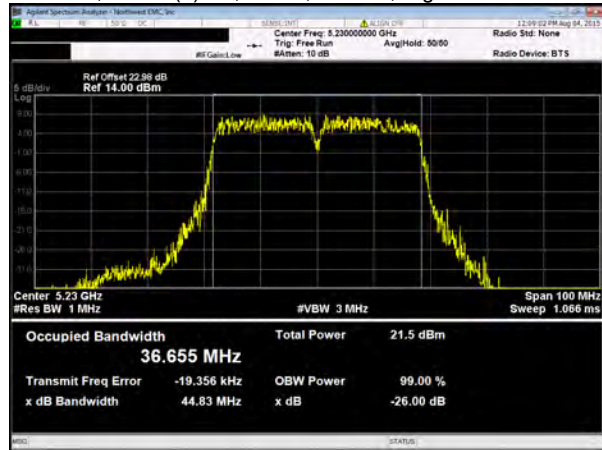
Value	17.566 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(n) HT, MCS8, 40 MHz, Low Channel 5190 MHz



Value	44.307 MHz
Limit (>)	N/A
Result	N/A

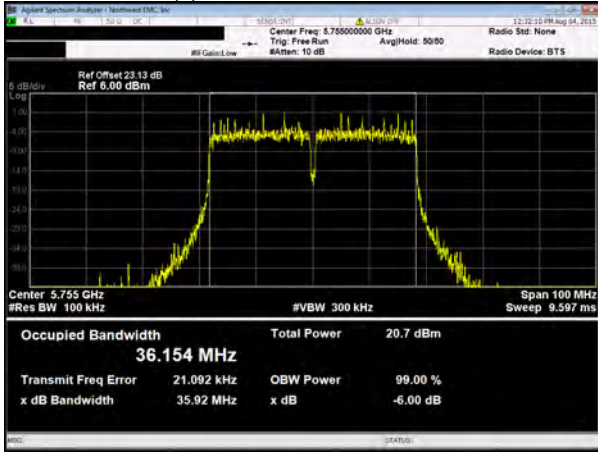
Chain B, 802.11(n) HT, MCS8, 40 MHz, High Channel 5230 MHz



Value	44.831 MHz
Limit (>)	N/A
Result	N/A

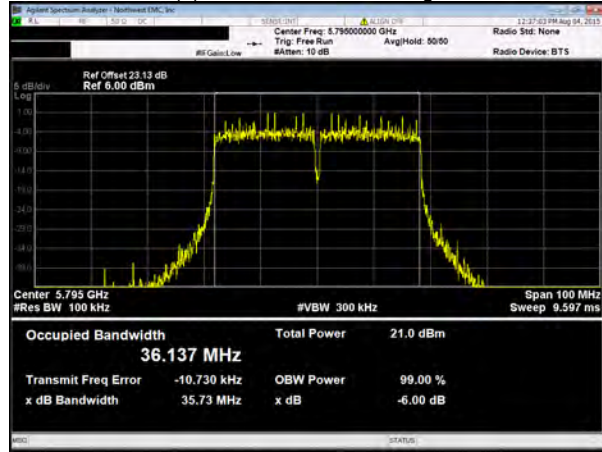
# EMISSION & OCCUPIED BANDWIDTH

Chain B, 802.11(n) HT, MCS8, 40 MHz, Low Channel 5755 MHz



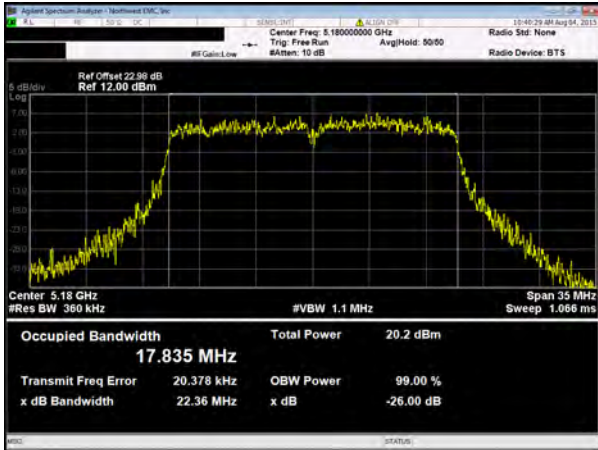
Value	35.917 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(n) HT, MCS8, 40 MHz, High Channel 5795 MHz



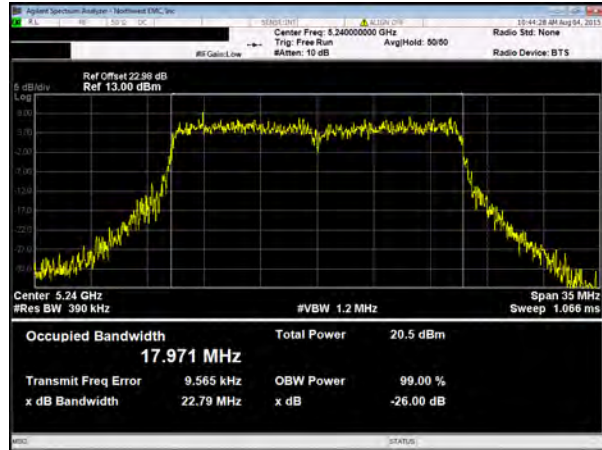
Value	35.735 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, Low Channel 5180 MHz



Value	22.364 MHz
Limit (>)	N/A
Result	N/A

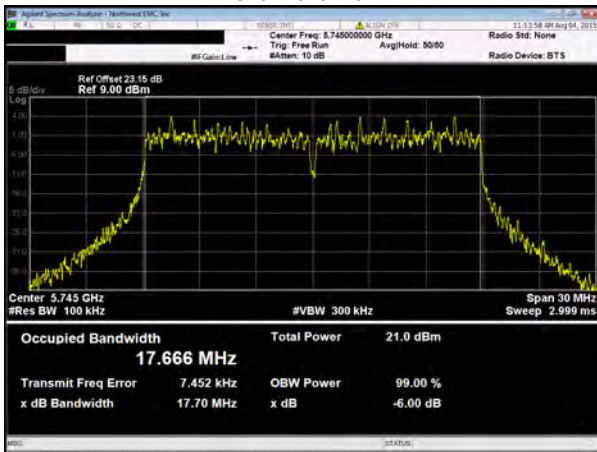
Chain B, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, High Channel 5240 MHz



Value	22.789 MHz
Limit (>)	N/A
Result	N/A

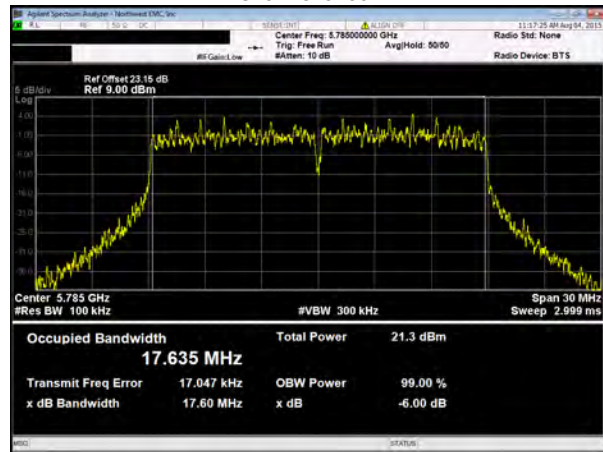
# EMISSION & OCCUPIED BANDWIDTH

Chain B, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, Low Channel 5745 MHz



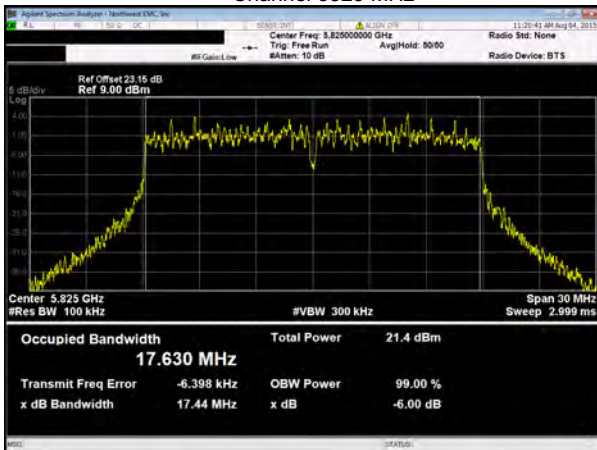
Value	17.701 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, Mid Channel 5785 MHz



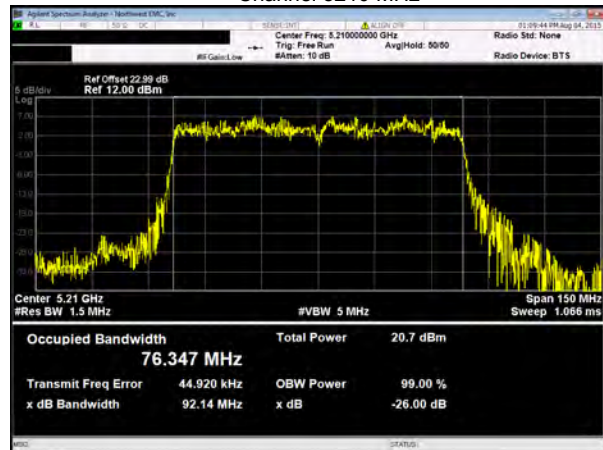
Value	17.596 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, High Channel 5825 MHz



Value	17.437 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(ac) VHT, MCS9 (256-QAM), 80 MHz, Low Channel 5210 MHz

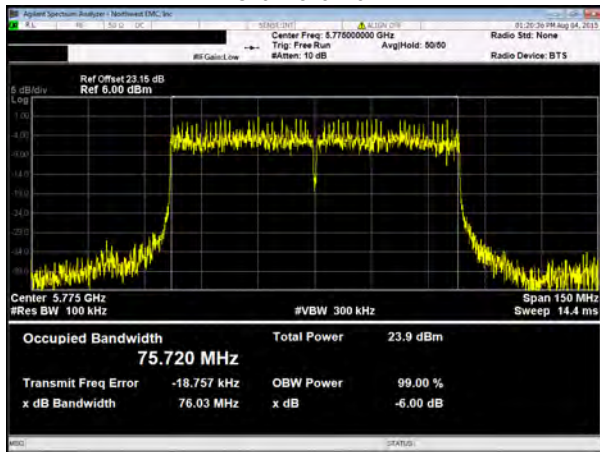


Value	92.135 MHz
Limit (>)	N/A
Result	N/A



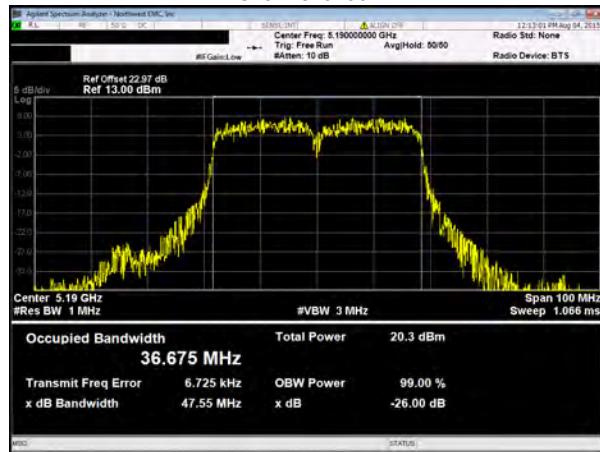
# EMISSION & OCCUPIED BANDWIDTH

Chain B, 802.11(ac) VHT, MCS9 (256-QAM), 80 MHz, Low Channel 5775 MHz



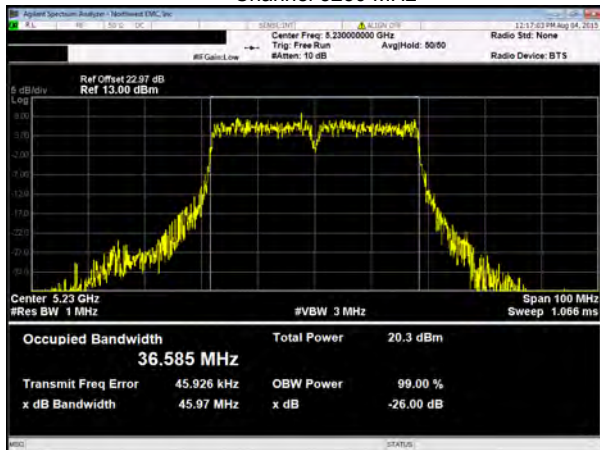
Value	76.027 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, Low Channel 5190 MHz



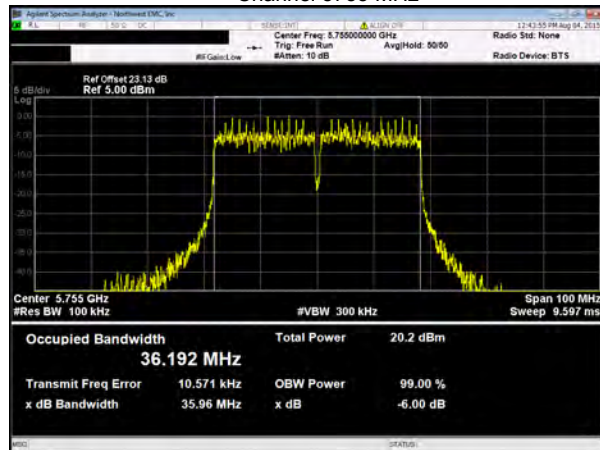
Value	47.546 MHz
Limit (>)	N/A
Result	N/A

Chain B, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, High Channel 5230 MHz



Value	45.973 MHz
Limit (>)	N/A
Result	N/A

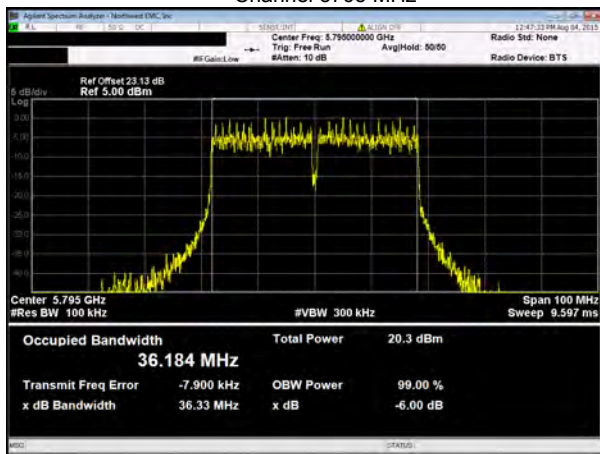
Chain B, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, Low Channel 5755 MHz



Value	35.964 MHz
Limit (>)	500 kHz
Result	Pass

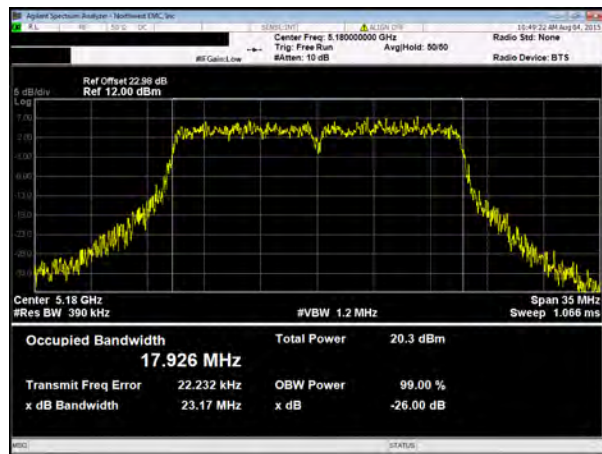
# EMISSION & OCCUPIED BANDWIDTH

Chain B, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, High Channel 5795 MHz



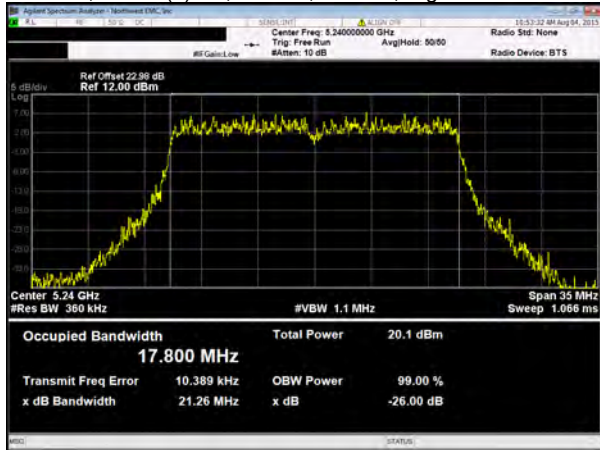
Value	36.33 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(n) HT, MCS15, 20 MHz, Low Channel 5180 MHz



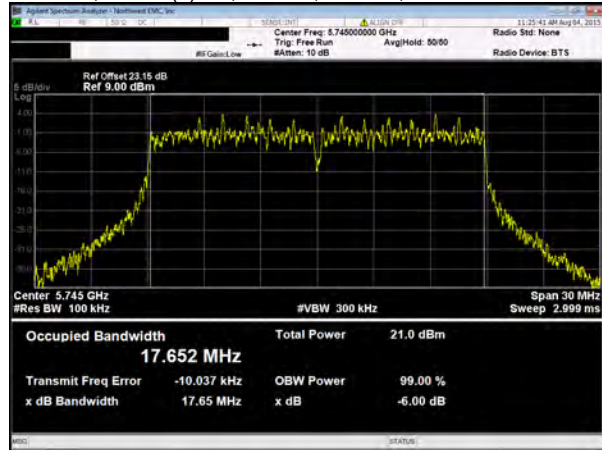
Value	23.166 MHz
Limit (>)	N/A
Result	N/A

Chain B, 802.11(n) HT, MCS15, 20 MHz, High Channel 5240 MHz



Value	21.26 MHz
Limit (>)	N/A
Result	N/A

Chain B, 802.11(n) HT, MCS15, 20 MHz, Low Channel 5745 MHz

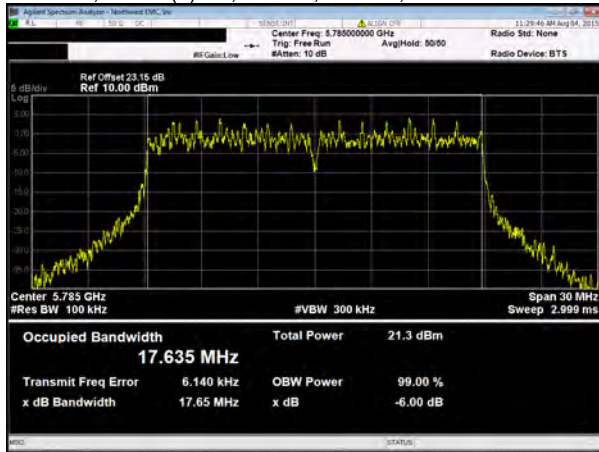


Value	17.648 MHz
Limit (>)	500 kHz
Result	Pass



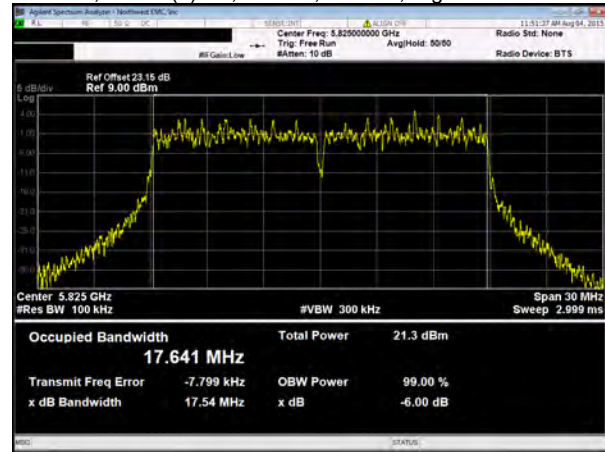
# EMISSION & OCCUPIED BANDWIDTH

Chain B, 802.11(n) HT, MCS15, 20 MHz, Mid Channel 5785 MHz



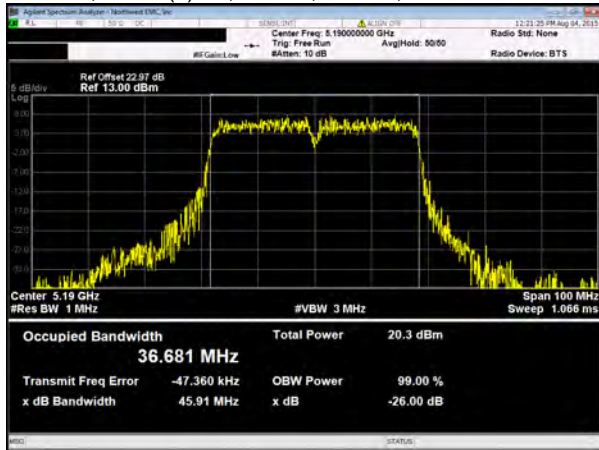
Value	17.654 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(n) HT, MCS15, 20 MHz, High Channel 5825 MHz



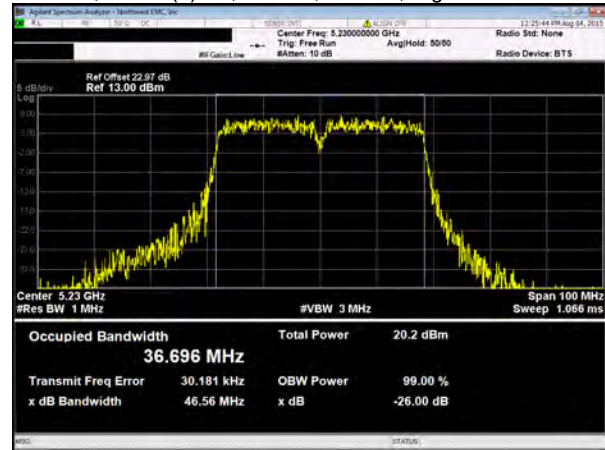
Value	17.537 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(n) HT, MCS15, 40 MHz, Low Channel 5190 MHz



Value	45.907 MHz
Limit (>)	N/A
Result	N/A

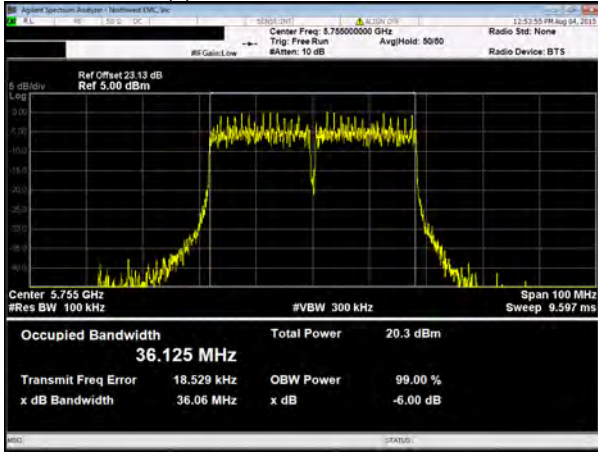
Chain B, 802.11(n) HT, MCS15, 40 MHz, High Channel 5230 MHz



Value	46.555 MHz
Limit (>)	N/A
Result	N/A

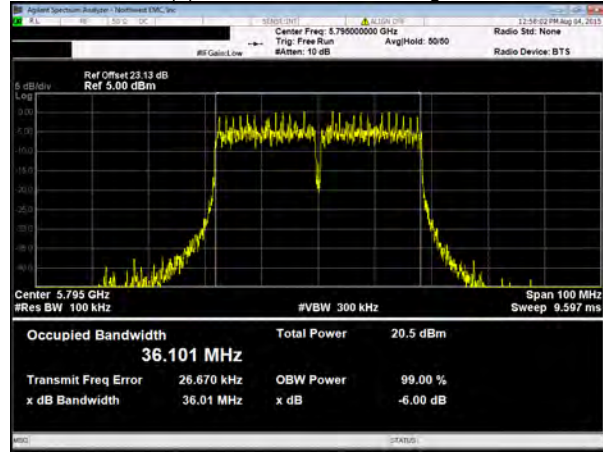
# EMISSION & OCCUPIED BANDWIDTH

Chain B, 802.11(n) HT, MCS15, 40 MHz, Low Channel 5755 MHz



Value	36.055 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(n) HT, MCS15, 40 MHz, High Channel 5795 MHz



Value	36.012 MHz
Limit (>)	500 kHz
Result	Pass

# EMISSION & OCCUPIED BANDWIDTH

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST DESCRIPTION

5.2GHz band

FCC KDB 789033 General UNII Test Procedures were followed.

The transmit frequencies and data rates listed in the datasheet were measured in each band utilized by the radio. A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input.

The spectrum analyzer settings were as follows:

- RBW = Approx. 1% of the emission bandwidth (B).
- VBW = > RBW
- Detector = Peak
- Trace mode = max hold

The spectrum analyzer occupied bandwidth measurement function was then used to measure 26 dB emission bandwidth.

There is no required limit to be met in the rule part for the 5.2GHz band. The purpose of the test is to both report the results as required by the KDB, and to utilize the emission bandwidth for setting the channel power integration bandwidth during conducted output power testing.

5.8GHz band

FCC KDB 789033 General UNII Test Procedures were followed to measure the minimum emission bandwidth for the 5.725-5.85 GHz band.

The transmit frequencies and data rates listed in the datasheet were measured in each band utilized by the radio. The transmit power was set to its default maximum.

A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input.

The spectrum analyzer settings were as follows:

- RBW = 100 kHz
- VBW =  $\geq 3 \times$  RBW
- Detector = Peak
- Trace mode = max hold

The spectrum analyzer occupied bandwidth measurement function was then used to measure 6 dB emission bandwidth.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Spectrum Analyzer	Agilent	N9010A	AFL	9/20/2014	9/20/2015
DC Block, 40 GHz	Fairview Microwave	SD3379	AMM	2/27/2015	2/27/2016
Attenuator, 20dB, 40 GHz	Fairview Microwave	SA4018-20	TQY	2/27/2015	2/27/2016
Signal Generator, 40 GHz	Agilent	N5173B	TIW	7/15/2014	7/15/2017

# EMISSION & OCCUPIED BANDWIDTH

EUT:	Firebox T50-W (BS5AE7W)	Work Order:	VDEI0009
Serial Number:	70AF00069-3EB6	Date:	08/05/15
Customer:	WatchGuard Technologies, Inc.	Temperature:	25.4°C
Attendees:	None	Relative Humidity:	43%
Customer Project:	None	Bar. Pressure:	1014 mbar
Tested By:	Jonathan Kiefer	Job Site:	TX09
Power:	110VAC/60Hz	Configuration:	1

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.407:2015	ANSI C63.10:2013

## COMMENTS

2x2 MIMO mode, Chain AC (Chains 0 and 2).

## DEVIATIONS FROM TEST STANDARD

None

## RESULTS

		Value	Limit (>)	Result
Chain A				
802.11(n) HT, MCS0				
80 MHz				
	Low Channel 5210 MHz	86.277 MHz	N/A	N/A
	Low Channel 5775 MHz	75.155 MHz	500 kHz	Pass
802.11(n) HT, MCS8				
20 MHz				
	Low Channel 5180 MHz	23.503 MHz	N/A	N/A
	High Channel 5240 MHz	23.004 MHz	N/A	N/A
	Low Channel 5745 MHz	17.567 MHz	500 kHz	Pass
	Mid Channel 5785 MHz	17.535 MHz	500 kHz	Pass
	High Channel 5825 MHz	17.569 MHz	500 kHz	Pass
40 MHz				
	Low Channel 5190 MHz	44.02 MHz	N/A	N/A
	High Channel 5230 MHz	44.019 MHz	N/A	N/A
	Low Channel 5755 MHz	35.949 MHz	500 kHz	Pass
	High Channel 5795 MHz	35.431 MHz	500 kHz	Pass
802.11(ac) VHT, MCS8 (256-QAM)				
20 MHz				
	Low Channel 5180 MHz	23.552 MHz	N/A	N/A
	High Channel 5240 MHz	23.269 MHz	N/A	N/A
	Low Channel 5745 MHz	17.627 MHz	500 kHz	Pass
	Mid Channel 5785 MHz	17.705 MHz	500 kHz	Pass
	High Channel 5825 MHz	17.657 MHz	500 kHz	Pass
802.11(ac) VHT, MCS9 (256-QAM)				
80 MHz				
	Low Channel 5210 MHz	92.555 MHz	N/A	N/A
	Low Channel 5775 MHz	76.411 MHz	500 kHz	Pass
40 MHz				
	Low Channel 5190 MHz	48.154 MHz	N/A	N/A

# EMISSION & OCCUPIED BANDWIDTH

		Value	Limit (>)	Result
	High Channel 5230 MHz	46.955 MHz	N/A	N/A
	Low Channel 5755 MHz	36.443 MHz	500 kHz	Pass
	High Channel 5795 MHz	36.008 MHz	500 kHz	Pass
<b>802.11(n) HT, MCS15</b>				
	<b>20 MHz</b>			
	Low Channel 5180 MHz	24.121 MHz	N/A	N/A
	High Channel 5240 MHz	23.435 MHz	N/A	N/A
	Low Channel 5745 MHz	17.663 MHz	500 kHz	Pass
	Mid Channel 5785 MHz	17.61 MHz	500 kHz	Pass
	High Channel 5825 MHz	17.615 MHz	500 kHz	Pass
	<b>40 MHz</b>			
	Low Channel 5190 MHz	46.152 MHz	N/A	N/A
	High Channel 5230 MHz	45.447 MHz	N/A	N/A
	Low Channel 5755 MHz	36.447 MHz	500 kHz	Pass
	High Channel 5795 MHz	36.394 MHz	500 kHz	Pass
<b>Chain C</b>				
	<b>802.11(n) HT, MCS0</b>			
	<b>80 MHz</b>			
	Low Channel 5210 MHz	85.494 MHz	N/A	N/A
	Low Channel 5775 MHz	75.659 MHz	500 kHz	Pass
	<b>802.11(n) HT, MCS8</b>			
	<b>20 MHz</b>			
	Low Channel 5180 MHz	22.054 MHz	N/A	N/A
	High Channel 5240 MHz	22.593 MHz	N/A	N/A
	Low Channel 5745 MHz	17.581 MHz	500 kHz	Pass
	Mid Channel 5785 MHz	17.586 MHz	500 kHz	Pass
	High Channel 5825 MHz	17.608 MHz	500 kHz	Pass
	<b>40 MHz</b>			
	Low Channel 5190 MHz	42.964 MHz	N/A	N/A
	High Channel 5230 MHz	43.733 MHz	N/A	N/A
	Low Channel 5755 MHz	35.963 MHz	500 kHz	Pass
	High Channel 5795 MHz	35.985 MHz	500 kHz	Pass
	<b>802.11(ac) VHT, MCS8 (256-QAM)</b>			
	<b>20 MHz</b>			
	Low Channel 5180 MHz	22.835 MHz	N/A	N/A
	High Channel 5240 MHz	23.442 MHz	N/A	N/A
	Low Channel 5745 MHz	17.608 MHz	500 kHz	Pass
	Mid Channel 5785 MHz	17.353 MHz	500 kHz	Pass
	High Channel 5825 MHz	17.677 MHz	500 kHz	Pass
	<b>802.11(ac) VHT, MCS9 (256-QAM)</b>			
	<b>80 MHz</b>			
	Low Channel 5210 MHz	90.168 MHz	N/A	N/A
	Low Channel 5775 MHz	75.998 MHz	500 kHz	Pass
	<b>40 MHz</b>			



# EMISSION & OCCUPIED BANDWIDTH



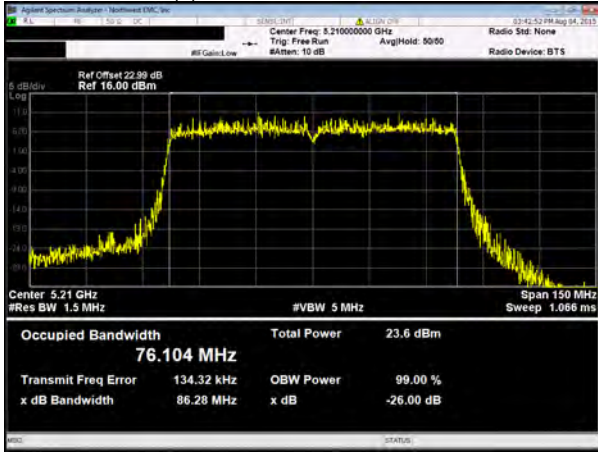
	Value	Limit (>)	Result
Low Channel 5190 MHz	45.437 MHz	N/A	N/A
High Channel 5230 MHz	46.249 MHz	N/A	N/A
Low Channel 5755 MHz	36.432 MHz	500 kHz	Pass
High Channel 5795 MHz	36.016 MHz	500 kHz	Pass
<b>802.11(n) HT, MCS15</b>			
<b>20 MHz</b>			
Low Channel 5180 MHz	22.628 MHz	N/A	N/A
High Channel 5240 MHz	24.029 MHz	N/A	N/A
Low Channel 5745 MHz	17.693 MHz	500 kHz	Pass
Mid Channel 5785 MHz	17.712 MHz	500 kHz	Pass
High Channel 5825 MHz	17.646 MHz	500 kHz	Pass
<b>40 MHz</b>			
Low Channel 5190 MHz	46.701 MHz	N/A	N/A
High Channel 5230 MHz	45.201 MHz	N/A	N/A
Low Channel 5755 MHz	36.075 MHz	500 kHz	Pass
High Channel 5795 MHz	35.724 MHz	500 kHz	Pass

*Jonathan Kiefer*

Tested By

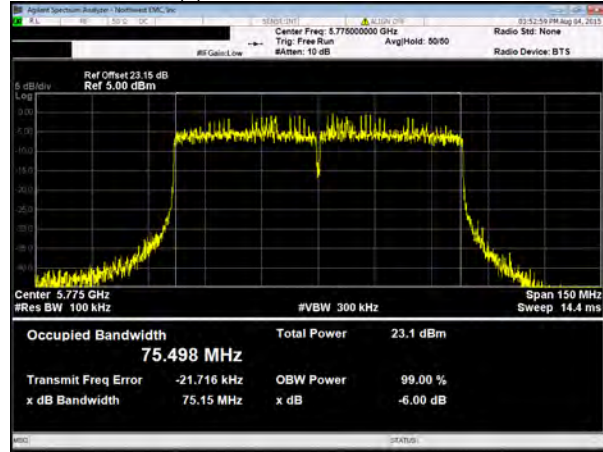
# EMISSION & OCCUPIED BANDWIDTH

Chain A, 802.11(n) HT, MCS0, 80 MHz, Low Channel 5210 MHz



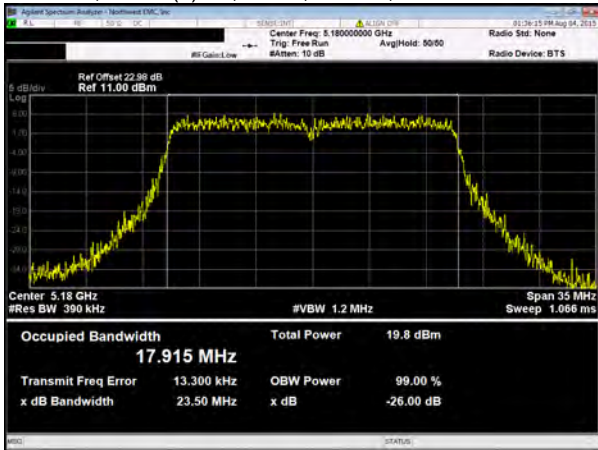
Value	86.277 MHz
Limit (>)	N/A
Result	N/A

Chain A, 802.11(n) HT, MCS0, 80 MHz, Low Channel 5775 MHz



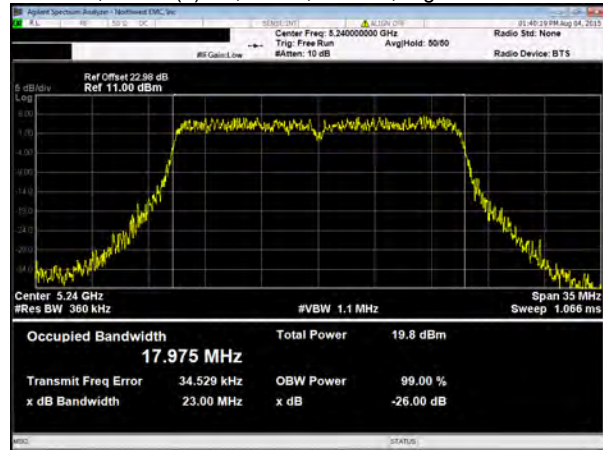
Value	75.155 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(n) HT, MCS8, 20 MHz, Low Channel 5180 MHz



Value	23.503 MHz
Limit (>)	N/A
Result	N/A

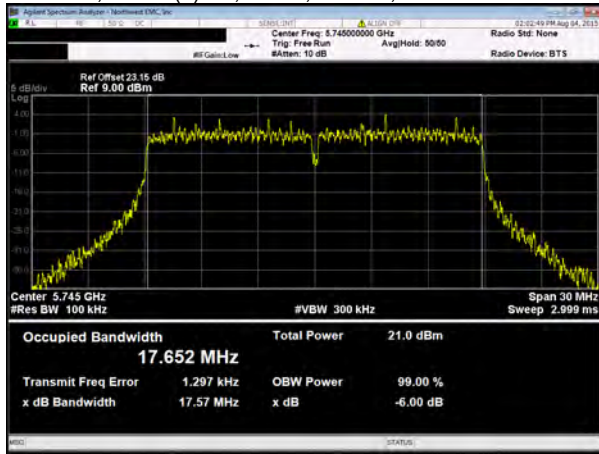
Chain A, 802.11(n) HT, MCS8, 20 MHz, High Channel 5240 MHz



Value	23.004 MHz
Limit (>)	N/A
Result	N/A

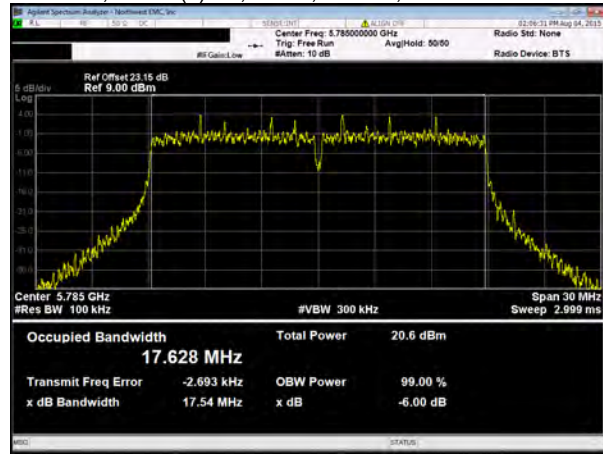
# EMISSION & OCCUPIED BANDWIDTH

Chain A, 802.11(n) HT, MCS8, 20 MHz, Low Channel 5745 MHz



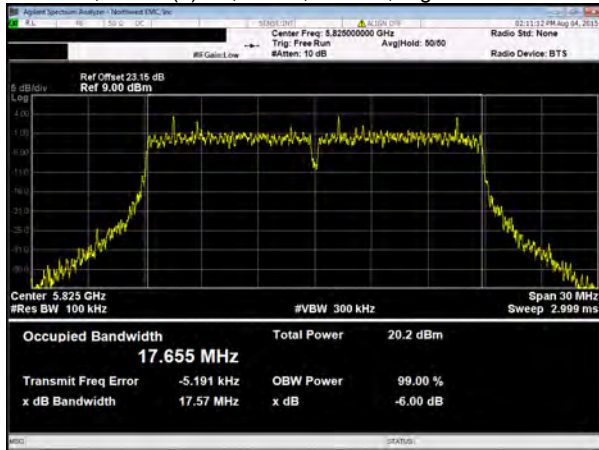
Value	17.567 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(n) HT, MCS8, 20 MHz, Mid Channel 5785 MHz



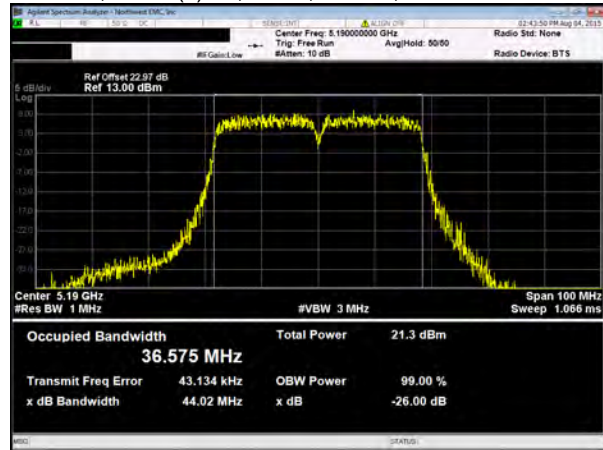
Value	17.535 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(n) HT, MCS8, 20 MHz, High Channel 5825 MHz



Value	17.569 MHz
Limit (>)	500 kHz
Result	Pass

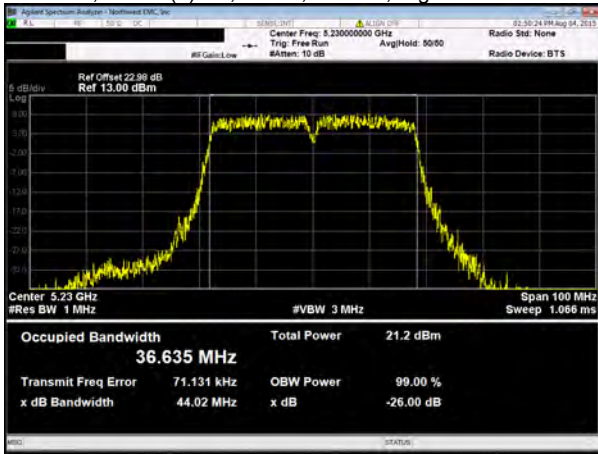
Chain A, 802.11(n) HT, MCS8, 40 MHz, Low Channel 5190 MHz



Value	44.02 MHz
Limit (>)	N/A
Result	N/A

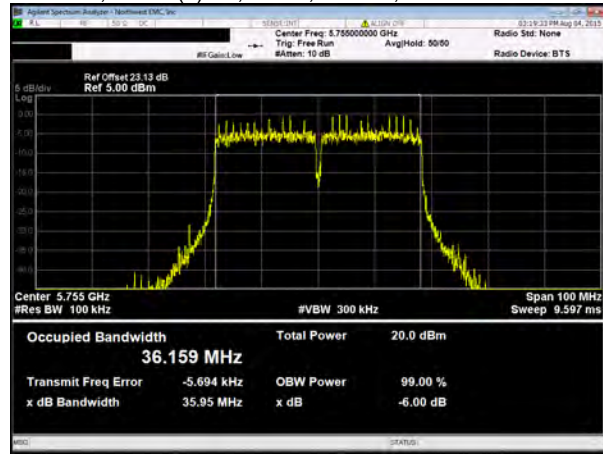
# EMISSION & OCCUPIED BANDWIDTH

Chain A, 802.11(n) HT, MCS8, 40 MHz, High Channel 5230 MHz



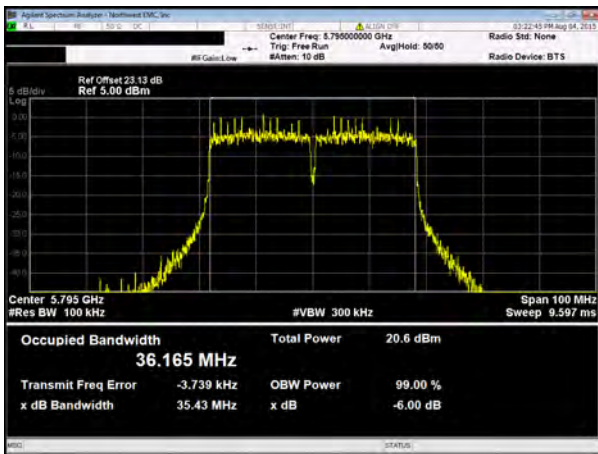
Value	44.019 MHz
Limit (>)	N/A
Result	N/A

Chain A, 802.11(n) HT, MCS8, 40 MHz, Low Channel 5755 MHz



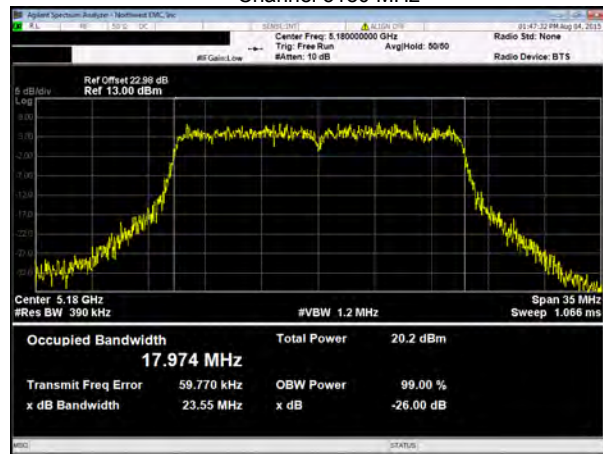
Value	35.949 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(n) HT, MCS8, 40 MHz, High Channel 5795 MHz



Value	35.431 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, Low Channel 5180 MHz

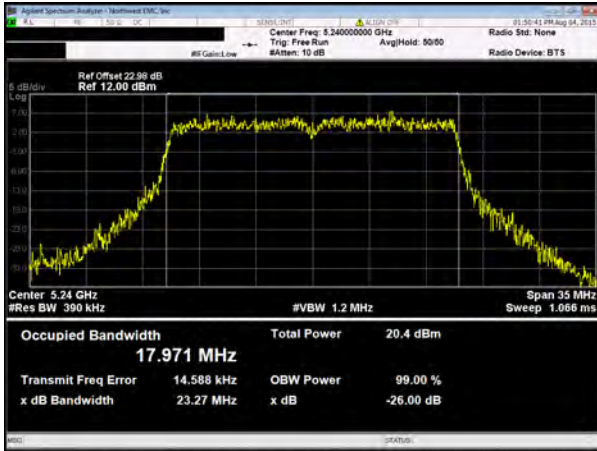


Value	23.552 MHz
Limit (>)	N/A
Result	N/A



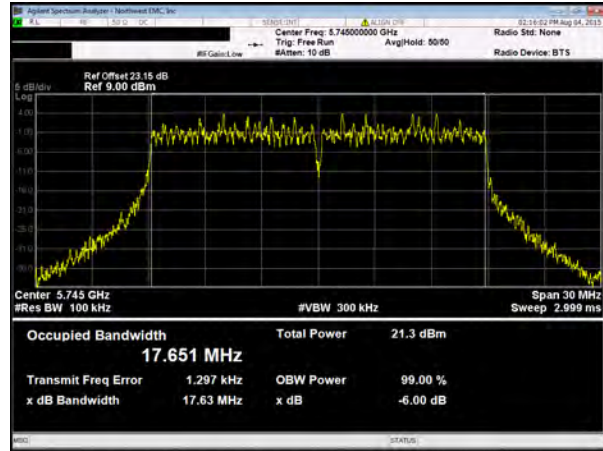
# EMISSION & OCCUPIED BANDWIDTH

Chain A, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, High Channel 5240 MHz



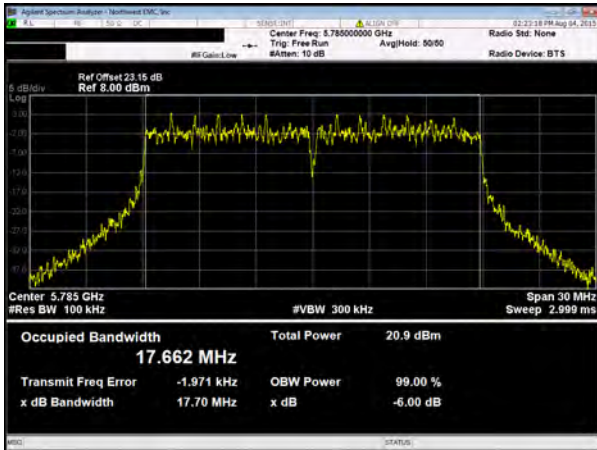
Value	23.269 MHz
Limit (>)	N/A
Result	N/A

Chain A, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, Low Channel 5745 MHz



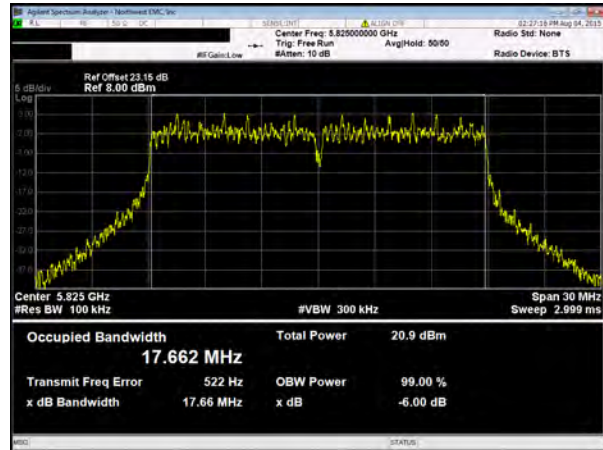
Value	17.627 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, Mid Channel 5785 MHz



Value	17.705 MHz
Limit (>)	500 kHz
Result	Pass

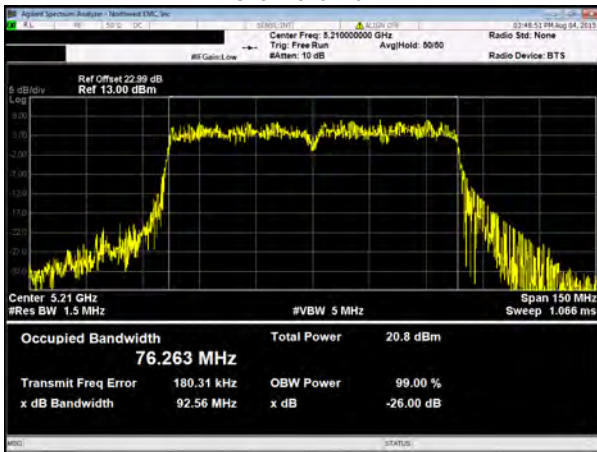
Chain A, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, High Channel 5825 MHz



Value	17.657 MHz
Limit (>)	500 kHz
Result	Pass

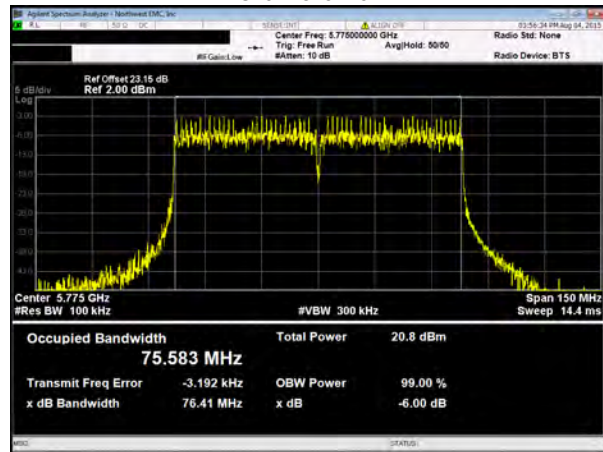
# EMISSION & OCCUPIED BANDWIDTH

Chain A, 802.11(ac) VHT, MCS9 (256-QAM), 80 MHz, Low  
Channel 5210 MHz



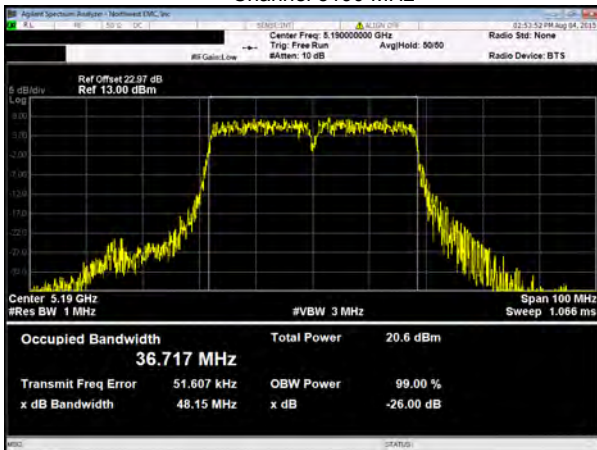
Value	92.555 MHz
Limit (>)	N/A
Result	N/A

Chain A, 802.11(ac) VHT, MCS9 (256-QAM), 80 MHz, Low  
Channel 5775 MHz



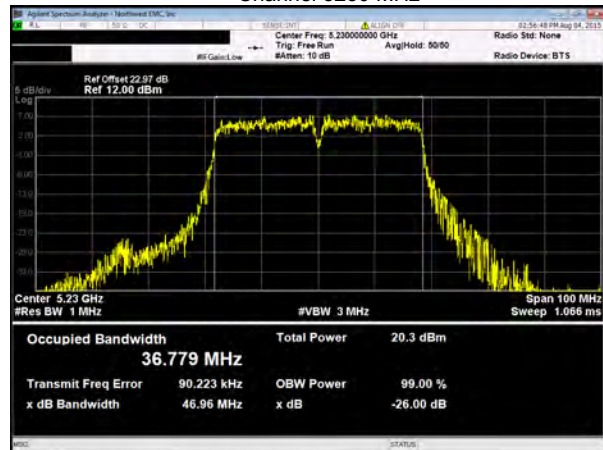
Value	76.411 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, Low  
Channel 5190 MHz



Value	48.154 MHz
Limit (>)	N/A
Result	N/A

Chain A, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, High  
Channel 5230 MHz

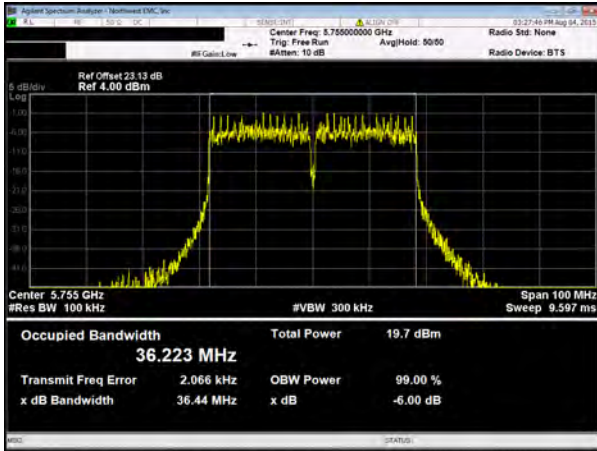


Value	46.955 MHz
Limit (>)	N/A
Result	N/A



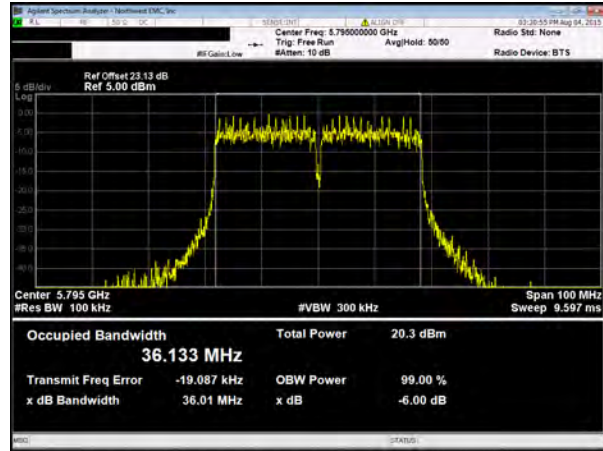
# EMISSION & OCCUPIED BANDWIDTH

Chain A, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, Low Channel 5755 MHz



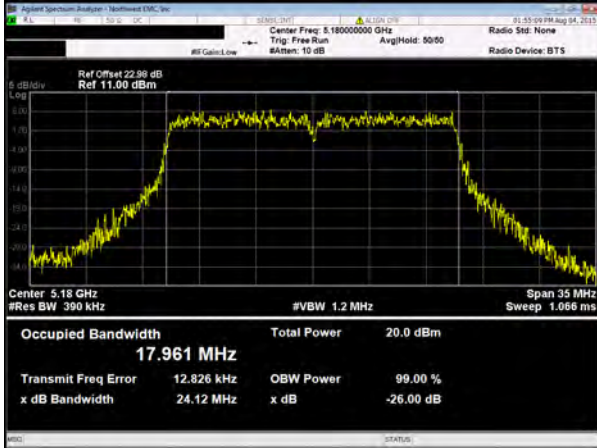
Value	36.443 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, High Channel 5795 MHz



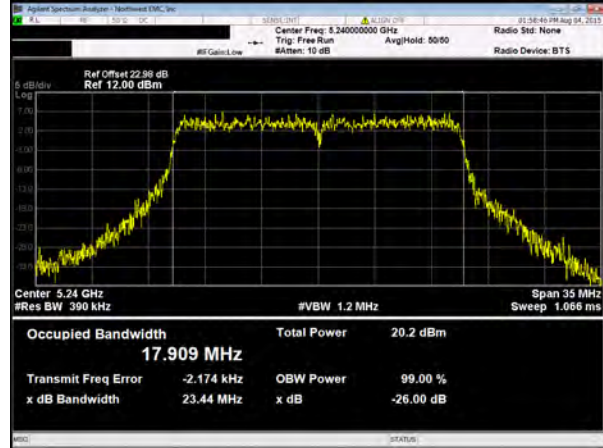
Value	36.008 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(n) HT, MCS15, 20 MHz, Low Channel 5180 MHz



Value	24.121 MHz
Limit (>)	N/A
Result	N/A

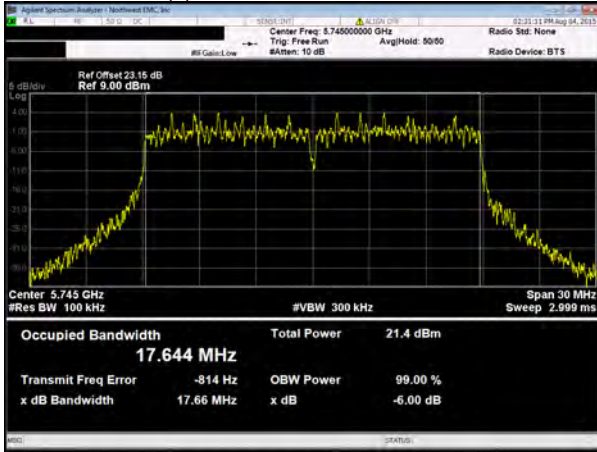
Chain A, 802.11(n) HT, MCS15, 20 MHz, High Channel 5240 MHz



Value	23.435 MHz
Limit (>)	N/A
Result	N/A

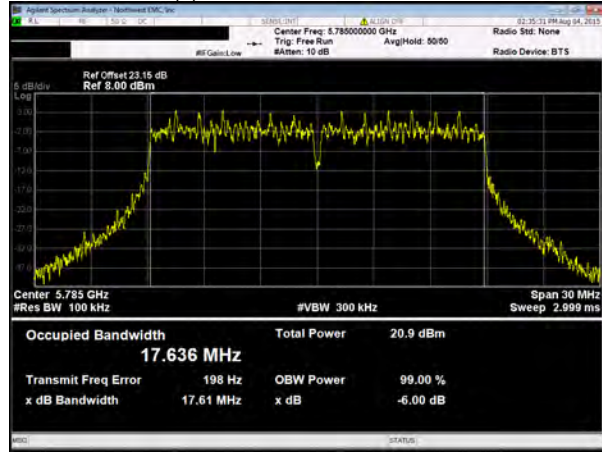
# EMISSION & OCCUPIED BANDWIDTH

Chain A, 802.11(n) HT, MCS15, 20 MHz, Low Channel 5745 MHz



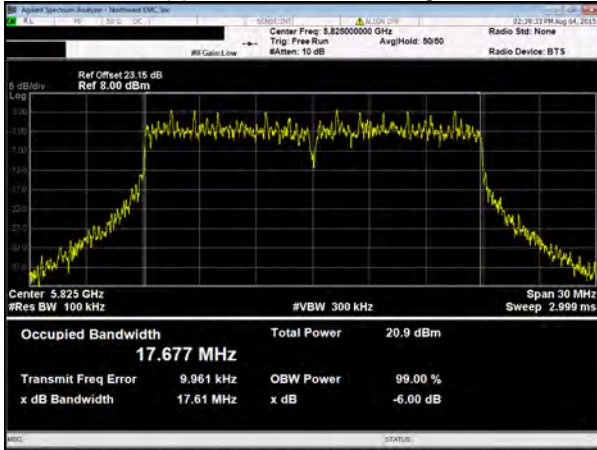
Value	17.663 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(n) HT, MCS15, 20 MHz, Mid Channel 5785 MHz



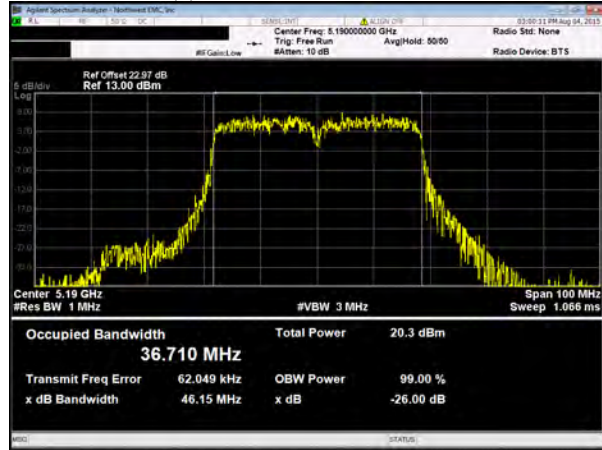
Value	17.61 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(n) HT, MCS15, 20 MHz, High Channel 5825 MHz



Value	17.615 MHz
Limit (>)	500 kHz
Result	Pass

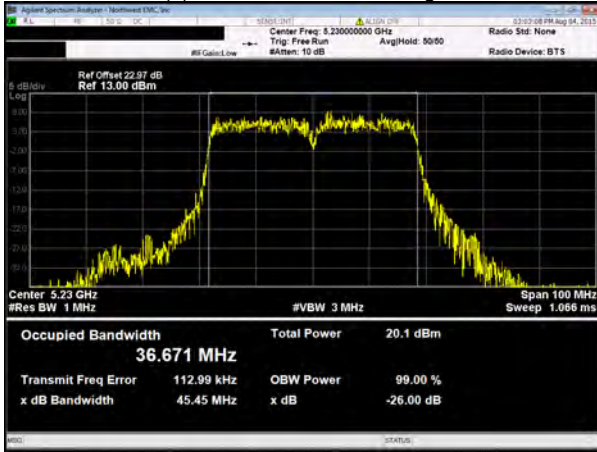
Chain A, 802.11(n) HT, MCS15, 40 MHz, Low Channel 5190 MHz



Value	46.152 MHz
Limit (>)	N/A
Result	N/A

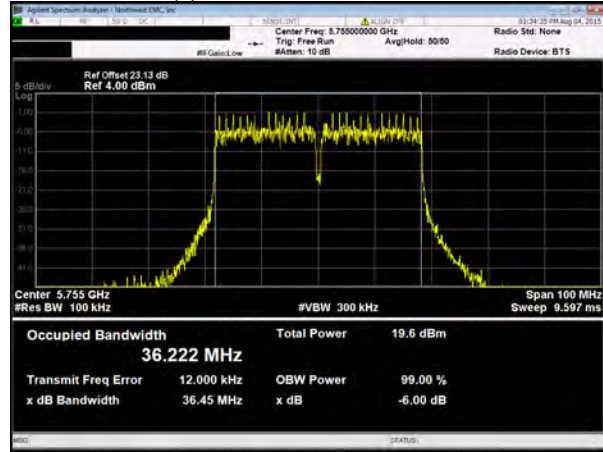
# EMISSION & OCCUPIED BANDWIDTH

Chain A, 802.11(n) HT, MCS15, 40 MHz, High Channel 5230 MHz



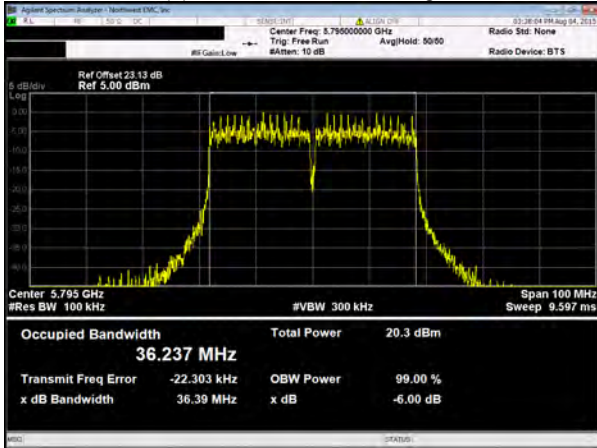
Value	45.447 MHz
Limit (>)	N/A
Result	N/A

Chain A, 802.11(n) HT, MCS15, 40 MHz, Low Channel 5755 MHz



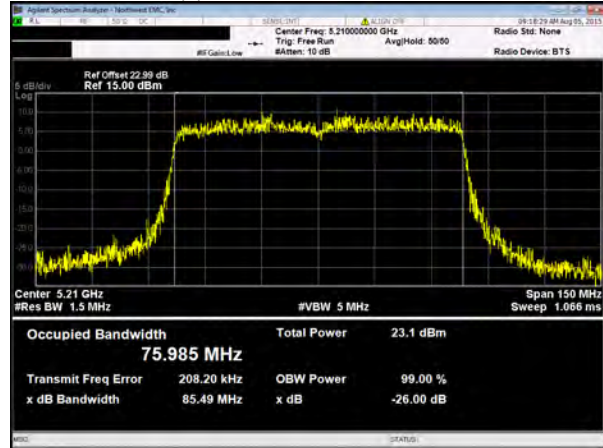
Value	36.447 MHz
Limit (>)	500 kHz
Result	Pass

Chain A, 802.11(n) HT, MCS15, 40 MHz, High Channel 5795 MHz



Value	36.394 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(n) HT, MCS0, 80 MHz, Low Channel 5210 MHz

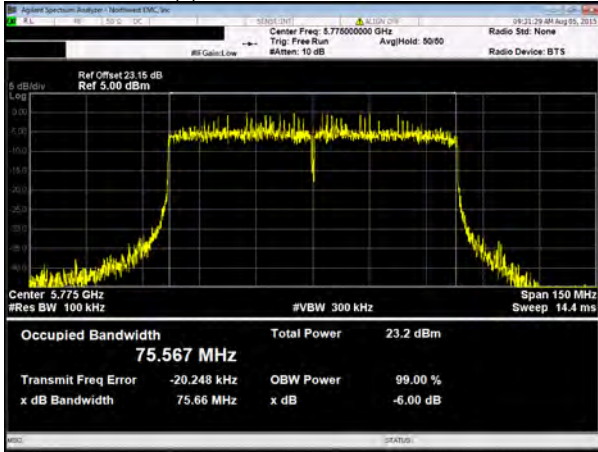


Value	85.494 MHz
Limit (>)	N/A
Result	N/A



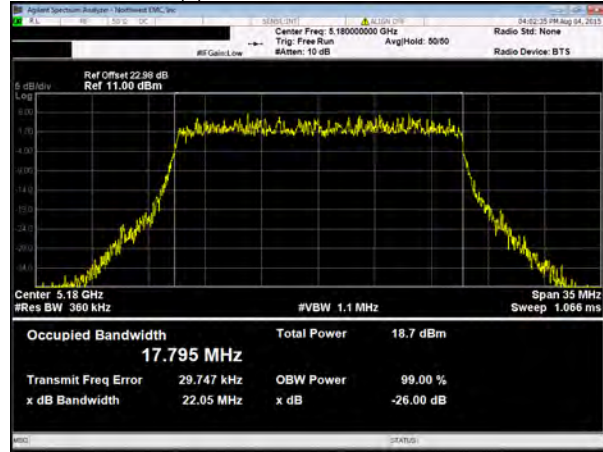
# EMISSION & OCCUPIED BANDWIDTH

Chain C, 802.11(n) HT, MCS0, 80 MHz, Low Channel 5775 MHz



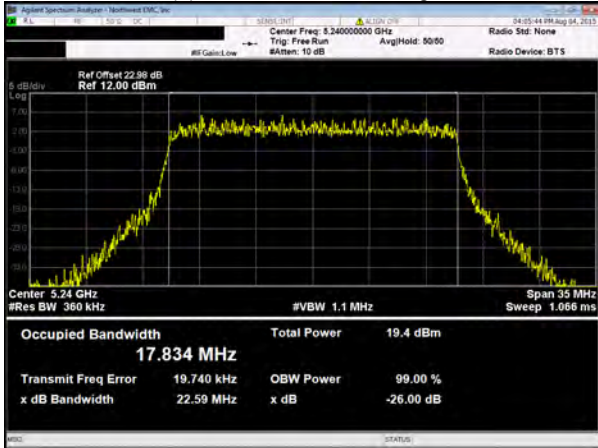
Value	75.659 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(n) HT, MCS8, 20 MHz, Low Channel 5180 MHz



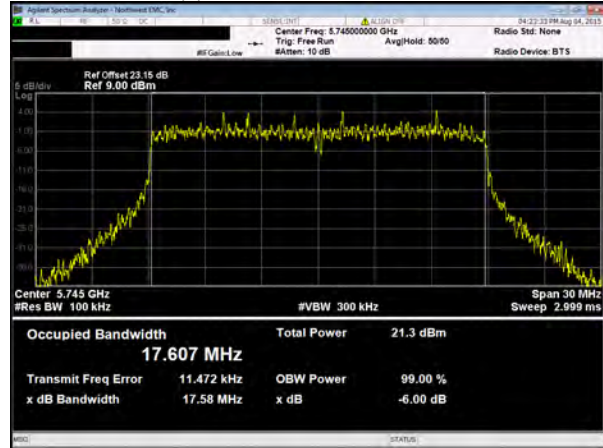
Value	22.054 MHz
Limit (>)	N/A
Result	N/A

Chain C, 802.11(n) HT, MCS8, 20 MHz, High Channel 5240 MHz



Value	22.593 MHz
Limit (>)	N/A
Result	N/A

Chain C, 802.11(n) HT, MCS8, 20 MHz, Low Channel 5745 MHz

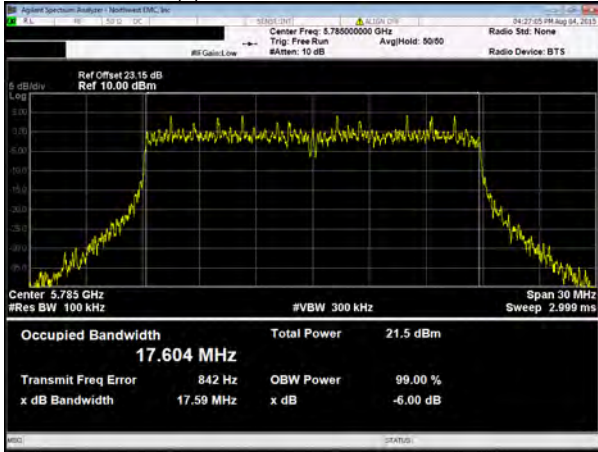


Value	17.581 MHz
Limit (>)	500 kHz
Result	Pass



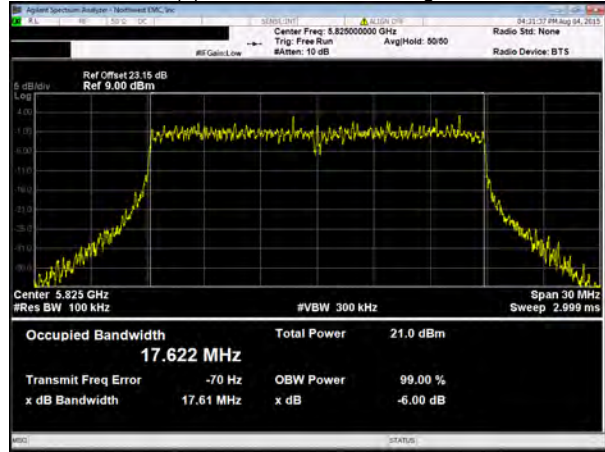
# EMISSION & OCCUPIED BANDWIDTH

Chain C, 802.11(n) HT, MCS8, 20 MHz, Mid Channel 5785 MHz



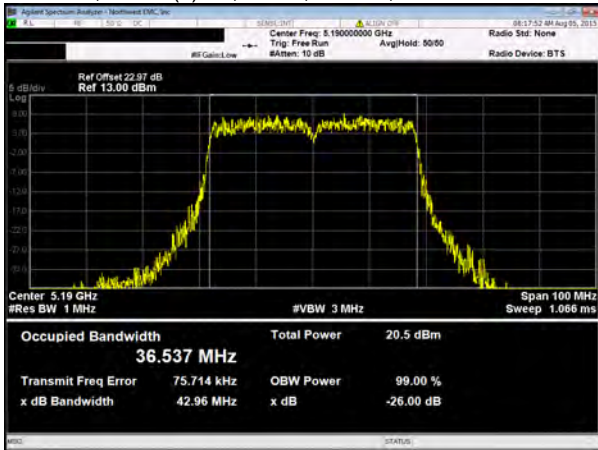
Value	17.586 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(n) HT, MCS8, 20 MHz, High Channel 5825 MHz



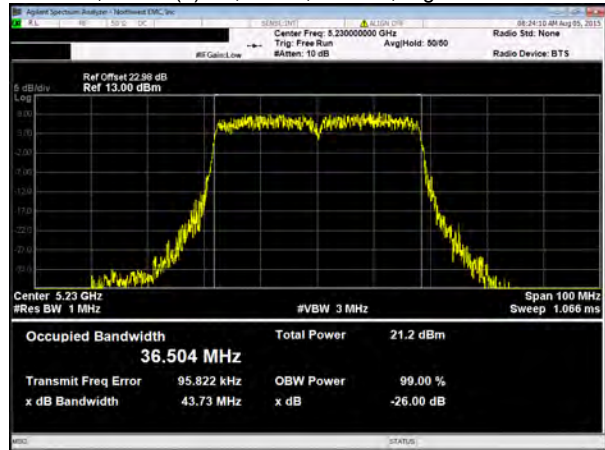
Value	17.608 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(n) HT, MCS8, 40 MHz, Low Channel 5190 MHz



Value	42.964 MHz
Limit (>)	N/A
Result	N/A

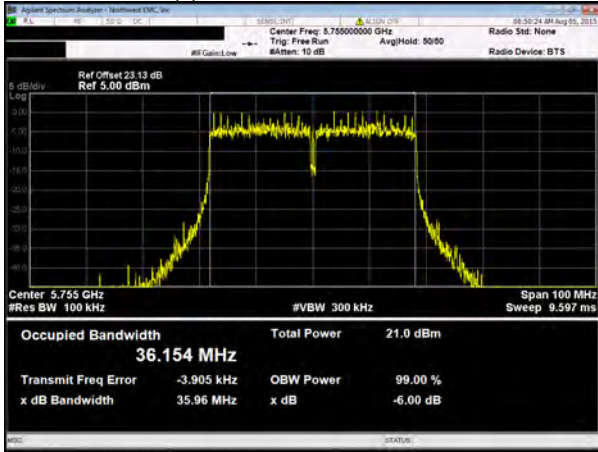
Chain C, 802.11(n) HT, MCS8, 40 MHz, High Channel 5230 MHz



Value	43.733 MHz
Limit (>)	N/A
Result	N/A

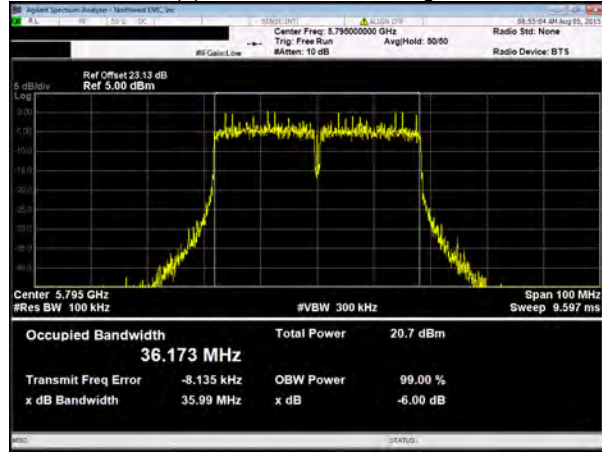
# EMISSION & OCCUPIED BANDWIDTH

Chain C, 802.11(n) HT, MCS8, 40 MHz, Low Channel 5755 MHz



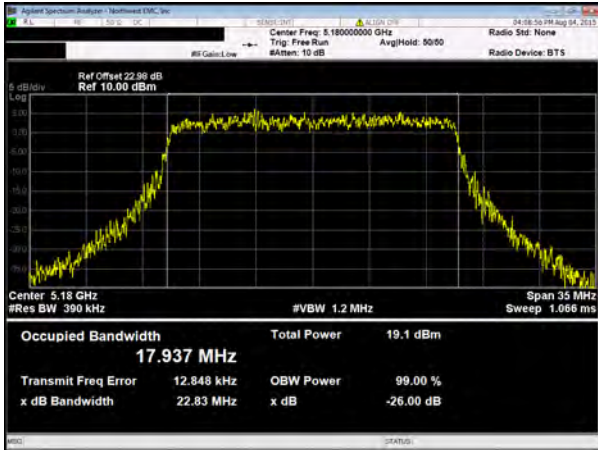
Value	35.963 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(n) HT, MCS8, 40 MHz, High Channel 5795 MHz



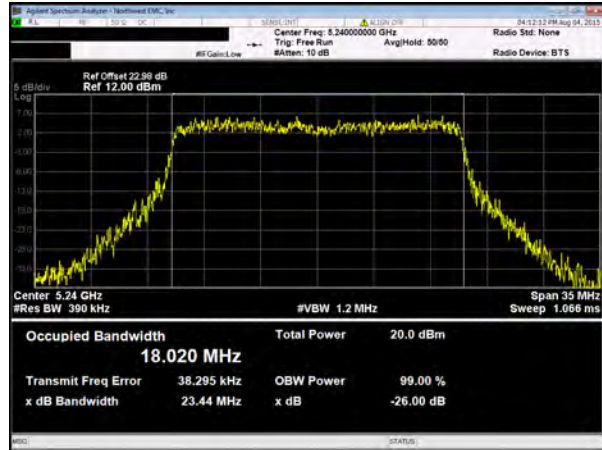
Value	35.985 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, Low Channel 5180 MHz



Value	22.835 MHz
Limit (>)	N/A
Result	N/A

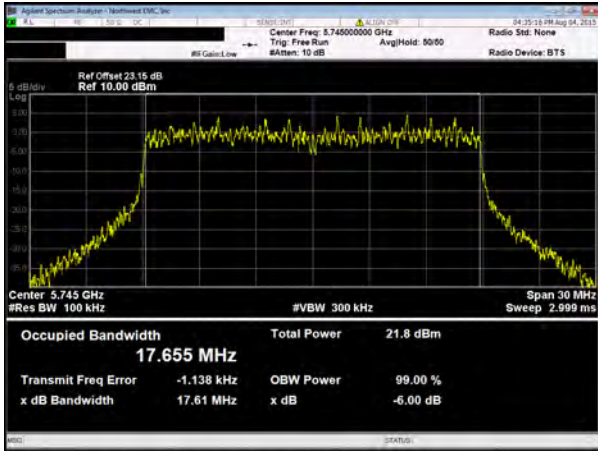
Chain C, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, High Channel 5240 MHz



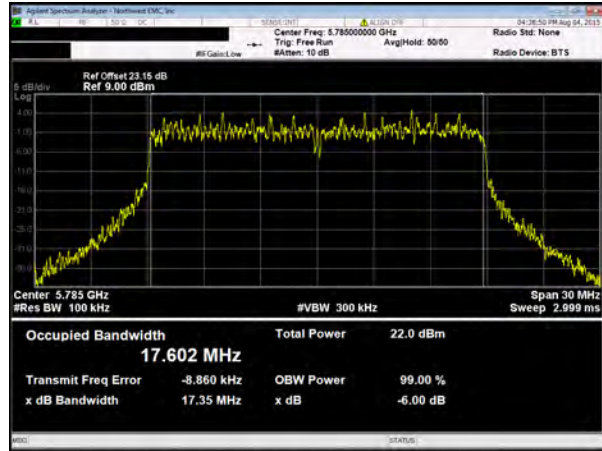
Value	23.442 MHz
Limit (>)	N/A
Result	N/A

# EMISSION & OCCUPIED BANDWIDTH

Chain C, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, Low Channel 5745 MHz



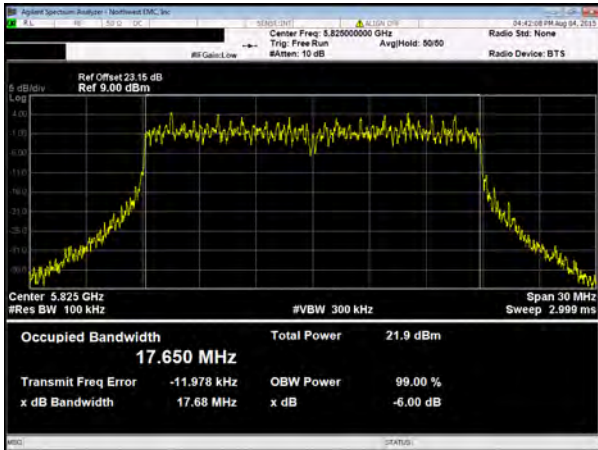
Chain C, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, Mid Channel 5785 MHz



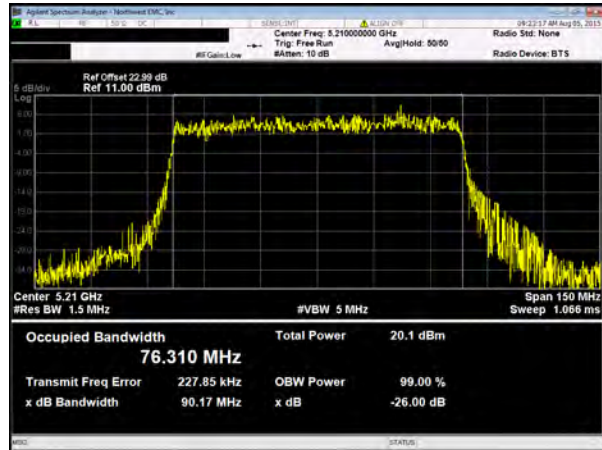
Value	17.608 MHz
Limit (>)	500 kHz
Result	Pass

Value	17.353 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, High Channel 5825 MHz



Chain C, 802.11(ac) VHT, MCS9 (256-QAM), 80 MHz, Low Channel 5210 MHz



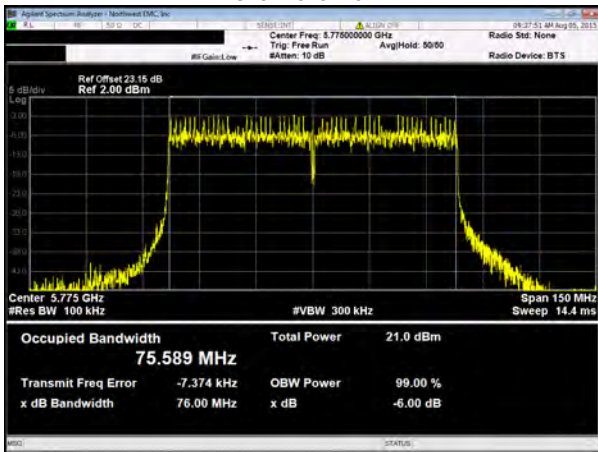
Value	17.677 MHz
Limit (>)	500 kHz
Result	Pass

Value	90.168 MHz
Limit (>)	N/A
Result	N/A



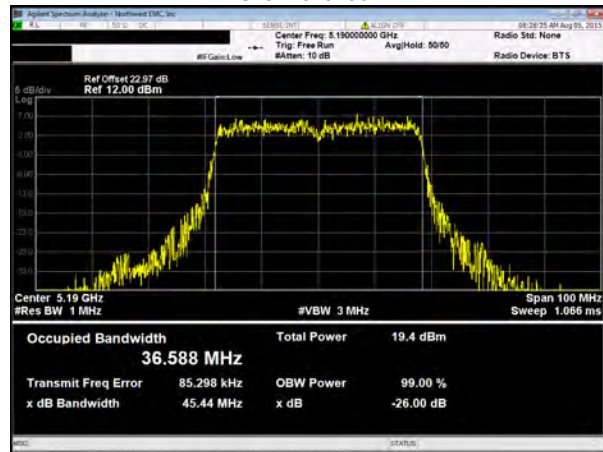
# EMISSION & OCCUPIED BANDWIDTH

Chain C, 802.11(ac) VHT, MCS9 (256-QAM), 80 MHz, Low Channel 5775 MHz



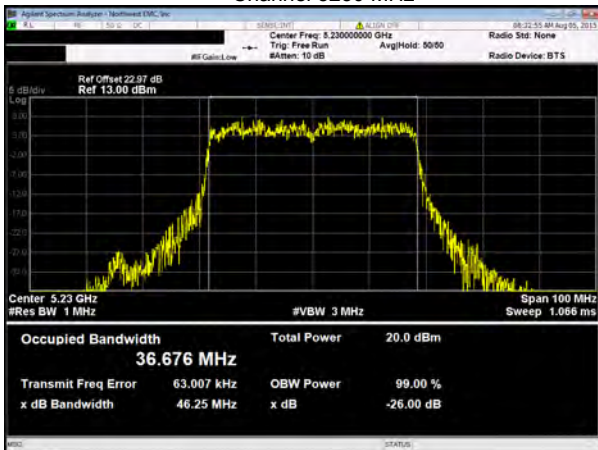
Value	75.998 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, Low Channel 5190 MHz



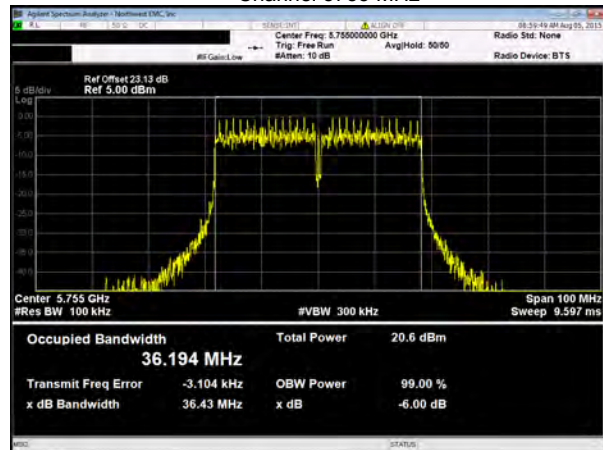
Value	45.437 MHz
Limit (>)	N/A
Result	N/A

Chain C, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, High Channel 5230 MHz



Value	46.249 MHz
Limit (>)	N/A
Result	N/A

Chain C, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, Low Channel 5755 MHz

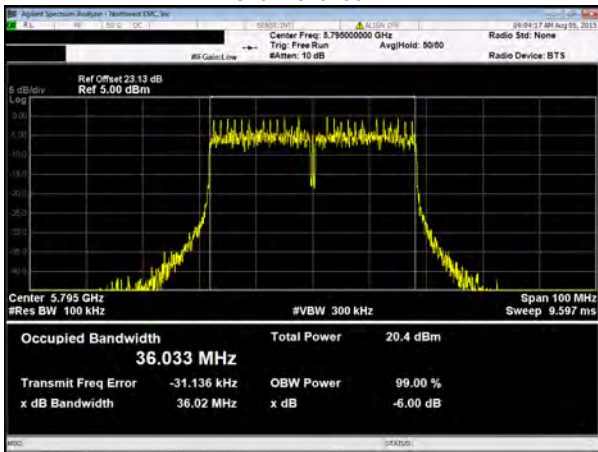


Value	36.432 MHz
Limit (>)	500 kHz
Result	Pass



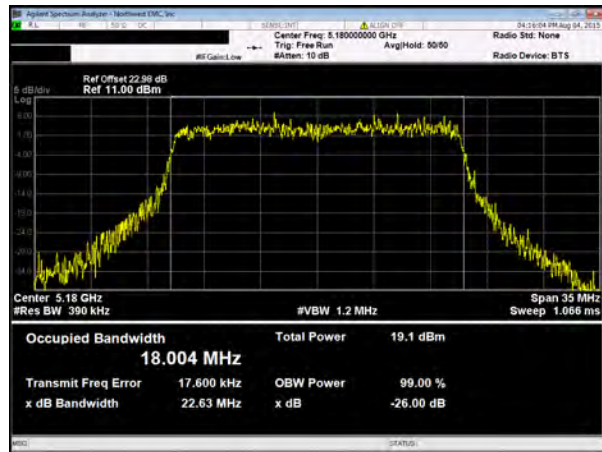
# EMISSION & OCCUPIED BANDWIDTH

Chain C, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, High Channel 5795 MHz



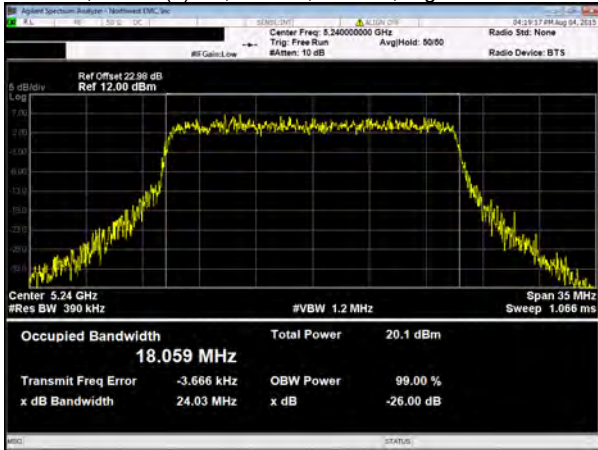
Value	36.016 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(n) HT, MCS15, 20 MHz, Low Channel 5180 MHz



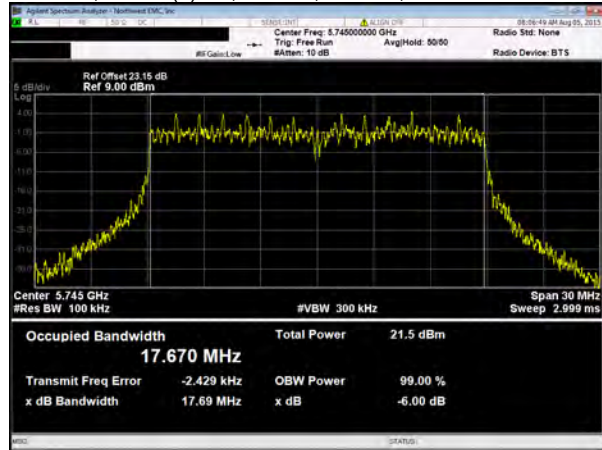
Value	22.628 MHz
Limit (>)	N/A
Result	N/A

Chain C, 802.11(n) HT, MCS15, 20 MHz, High Channel 5240 MHz



Value	24.029 MHz
Limit (>)	N/A
Result	N/A

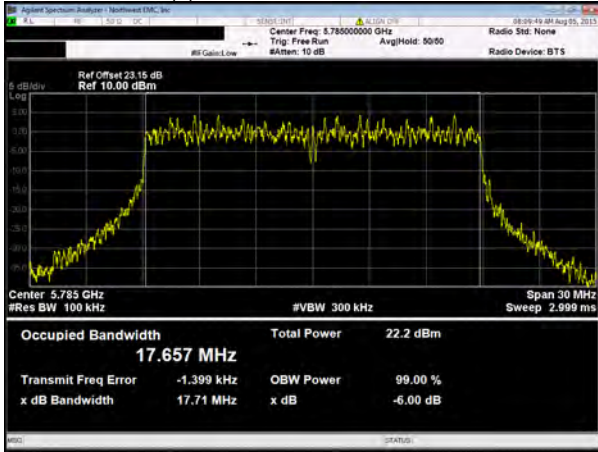
Chain C, 802.11(n) HT, MCS15, 20 MHz, Low Channel 5745 MHz



Value	17.693 MHz
Limit (>)	500 kHz
Result	Pass

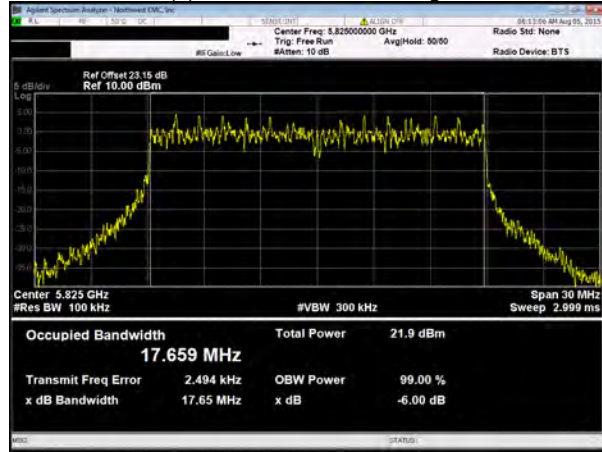
# EMISSION & OCCUPIED BANDWIDTH

Chain C, 802.11(n) HT, MCS15, 20 MHz, Mid Channel 5785 MHz



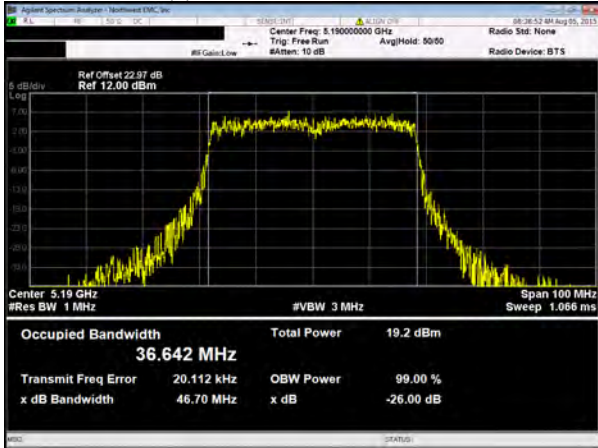
Value	17.712 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(n) HT, MCS15, 20 MHz, High Channel 5825 MHz



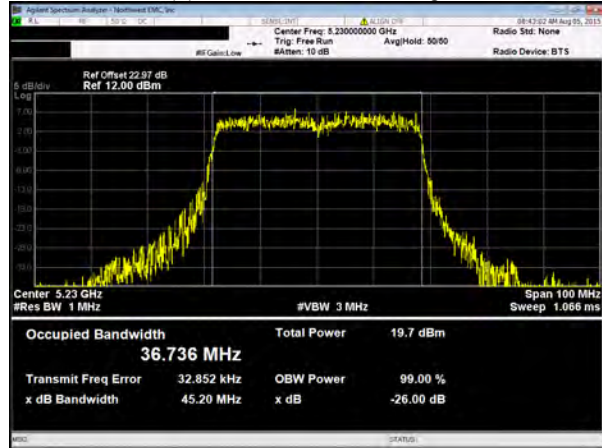
Value	17.646 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(n) HT, MCS15, 40 MHz, Low Channel 5190 MHz



Value	46.701 MHz
Limit (>)	N/A
Result	N/A

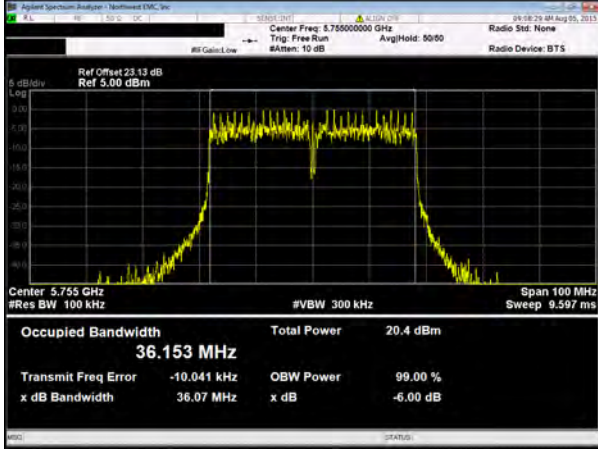
Chain C, 802.11(n) HT, MCS15, 40 MHz, High Channel 5230 MHz



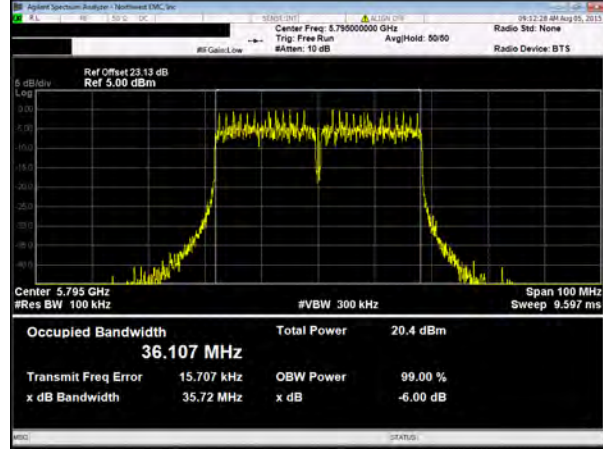
Value	45.201 MHz
Limit (>)	N/A
Result	N/A

# EMISSION & OCCUPIED BANDWIDTH

Chain C, 802.11(n) HT, MCS15, 40 MHz, Low Channel 5755 MHz



Chain C, 802.11(n) HT, MCS15, 40 MHz, High Channel 5795 MHz



Value	36.075 MHz
Limit (>)	500 kHz
Result	Pass

Value	35.724 MHz
Limit (>)	500 kHz
Result	Pass

# EMISSION & OCCUPIED BANDWIDTH

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST DESCRIPTION

5.2GHz band

FCC KDB 789033 General UNII Test Procedures were followed.

The transmit frequencies and data rates listed in the datasheet were measured in each band utilized by the radio. A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input.

The spectrum analyzer settings were as follows:

- RBW = Approx. 1% of the emission bandwidth (B).
- VBW = > RBW
- Detector = Peak
- Trace mode = max hold

The spectrum analyzer occupied bandwidth measurement function was then used to measure 26 dB emission bandwidth.

There is no required limit to be met in the rule part for the 5.2GHz band. The purpose of the test is to both report the results as required by the KDB, and to utilize the emission bandwidth for setting the channel power integration bandwidth during conducted output power testing.

5.8GHz band

FCC KDB 789033 General UNII Test Procedures were followed to measure the minimum emission bandwidth for the 5.725-5.85 GHz band.

The transmit frequencies and data rates listed in the datasheet were measured in each band utilized by the radio. The transmit power was set to its default maximum.

A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input.

The spectrum analyzer settings were as follows:

- RBW = 100 kHz
- VBW =  $\geq 3 \times$  RBW
- Detector = Peak
- Trace mode = max hold

The spectrum analyzer occupied bandwidth measurement function was then used to measure 6 dB emission bandwidth.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Spectrum Analyzer	Agilent	N9010A	AFL	9/20/2014	9/20/2015
DC Block, 40 GHz	Fairview Microwave	SD3379	AMM	2/27/2015	2/27/2016
Attenuator, 20dB, 40 GHz	Fairview Microwave	SA4018-20	TQY	2/27/2015	2/27/2016
Signal Generator, 40 GHz	Agilent	N5173B	TIW	7/15/2014	7/15/2017



# EMISSION & OCCUPIED BANDWIDTH

EUT:	Firebox T50-W (BS5AE7W)	Work Order:	VDEI0009
Serial Number:	70AF00069-3EB6	Date:	08/05/15
Customer:	WatchGuard Technologies, Inc.	Temperature:	25.4°C
Attendees:	None	Relative Humidity:	43%
Customer Project:	None	Bar. Pressure:	1014 mbar
Tested By:	Jonathan Kiefer	Job Site:	TX09
Power:	110VAC/60Hz	Configuration:	1

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.407:2015	ANSI C63.10:2013

## COMMENTS

2x2 MIMO mode, Chain BC (Chains 1 and 2).

## DEVIATIONS FROM TEST STANDARD

None

## RESULTS

	Value	Limit (>)	Result
<b>Chain B</b>			
802.11(n) HT, MCS0			
80 MHz			
Low Channel 5210 MHz	86.623 MHz	N/A	N/A
Low Channel 5775 MHz	72.542 MHz	500 kHz	Pass
802.11(n) HT, MCS8			
20 MHz			
Low Channel 5180 MHz	22.982 MHz	N/A	N/A
High Channel 5240 MHz	21.666 MHz	N/A	N/A
Low Channel 5745 MHz	17.529 MHz	500 kHz	Pass
Mid Channel 5785 MHz	17.579 MHz	500 kHz	Pass
High Channel 5825 MHz	17.533 MHz	500 kHz	Pass
40 MHz			
Low Channel 5190 MHz	44.258 MHz	N/A	N/A
High Channel 5230 MHz	45.09 MHz	N/A	N/A
Low Channel 5755 MHz	35.253 MHz	500 kHz	Pass
High Channel 5795 MHz	35.828 MHz	500 kHz	Pass
802.11(ac) VHT, MCS8 (256-QAM)			
20 MHz			
Low Channel 5180 MHz	23.156 MHz	N/A	N/A
High Channel 5240 MHz	23.992 MHz	N/A	N/A
Low Channel 5745 MHz	17.691 MHz	500 kHz	Pass
Mid Channel 5785 MHz	17.64 MHz	500 kHz	Pass
High Channel 5825 MHz	17.564 MHz	500 kHz	Pass
802.11(ac) VHT, MCS9 (256-QAM)			
80 MHz			
Low Channel 5210 MHz	92.029 MHz	N/A	N/A
Low Channel 5775 MHz	75.745 MHz	500 kHz	Pass
40 MHz			
Low Channel 5190 MHz	48.552 MHz	N/A	N/A

# EMISSION & OCCUPIED BANDWIDTH

		Value	Limit (>)	Result
	High Channel 5230 MHz	46.078 MHz	N/A	N/A
	Low Channel 5755 MHz	35.837 MHz	500 kHz	Pass
	High Channel 5795 MHz	36.376 MHz	500 kHz	Pass
<b>802.11(n) HT, MCS15</b>				
	<b>20 MHz</b>			
	Low Channel 5180 MHz	23.533 MHz	N/A	N/A
	High Channel 5240 MHz	22.474 MHz	N/A	N/A
	Low Channel 5745 MHz	17.636 MHz	500 kHz	Pass
	Mid Channel 5785 MHz	17.671 MHz	500 kHz	Pass
	High Channel 5825 MHz	17.636 MHz	500 kHz	Pass
	<b>40 MHz</b>			
	Low Channel 5190 MHz	45.215 MHz	N/A	N/A
	High Channel 5230 MHz	45.285 MHz	N/A	N/A
	Low Channel 5755 MHz	36.377 MHz	500 kHz	Pass
	High Channel 5795 MHz	36.364 MHz	500 kHz	Pass
<b>Chain C</b>				
	<b>802.11(n) HT, MCS0</b>			
	<b>80 MHz</b>			
	Low Channel 5210 MHz	85.662 MHz	N/A	N/A
	Low Channel 5775 MHz	76.33 MHz	500 kHz	Pass
	<b>802.11(n) HT, MCS8</b>			
	<b>20 MHz</b>			
	Low Channel 5180 MHz	21.545 MHz	N/A	N/A
	High Channel 5240 MHz	22.397 MHz	N/A	N/A
	Low Channel 5745 MHz	17.577 MHz	500 kHz	Pass
	Mid Channel 5785 MHz	17.583 MHz	500 kHz	Pass
	High Channel 5825 MHz	17.584 MHz	500 kHz	Pass
	<b>40 MHz</b>			
	Low Channel 5190 MHz	43.807 MHz	N/A	N/A
	High Channel 5230 MHz	44.236 MHz	N/A	N/A
	Low Channel 5755 MHz	36.318 MHz	500 kHz	Pass
	High Channel 5795 MHz	35.89 MHz	500 kHz	Pass
	<b>802.11(ac) VHT, MCS8 (256-QAM)</b>			
	<b>20 MHz</b>			
	Low Channel 5180 MHz	23.603 MHz	N/A	N/A
	High Channel 5240 MHz	23.363 MHz	N/A	N/A
	Low Channel 5745 MHz	17.679 MHz	500 kHz	Pass
	Mid Channel 5785 MHz	17.591 MHz	500 kHz	Pass
	High Channel 5825 MHz	17.659 MHz	500 kHz	Pass
	<b>802.11(ac) VHT, MCS9 (256-QAM)</b>			
	<b>80 MHz</b>			
	Low Channel 5210 MHz	91.086 MHz	N/A	N/A
	Low Channel 5775 MHz	76.055 MHz	500 kHz	Pass
	<b>40 MHz</b>			

# EMISSION & OCCUPIED BANDWIDTH

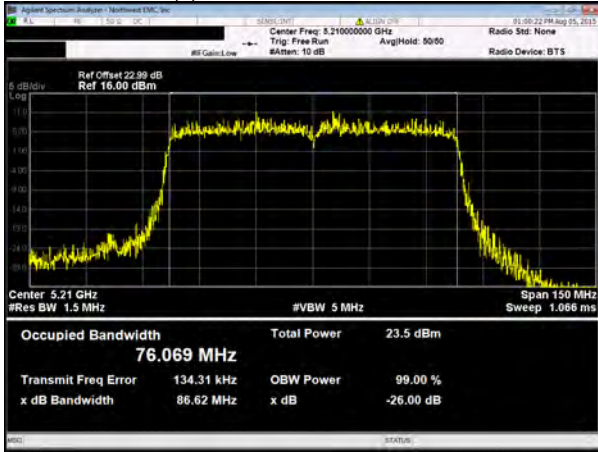
	Value	Limit (>)	Result
Low Channel 5190 MHz	47.234 MHz	N/A	N/A
High Channel 5230 MHz	45.425 MHz	N/A	N/A
Low Channel 5755 MHz	35.996 MHz	500 kHz	Pass
High Channel 5795 MHz	36.395 MHz	500 kHz	Pass
<b>802.11(n) HT, MCS15</b>			
<b>20 MHz</b>			
Low Channel 5180 MHz	23.716 MHz	N/A	N/A
High Channel 5240 MHz	22.973 MHz	N/A	N/A
Low Channel 5745 MHz	17.671 MHz	500 kHz	Pass
Mid Channel 5785 MHz	17.609 MHz	500 kHz	Pass
High Channel 5825 MHz	17.62 MHz	500 kHz	Pass
<b>40 MHz</b>			
Low Channel 5190 MHz	44.497 MHz	N/A	N/A
High Channel 5230 MHz	45.861 MHz	N/A	N/A
Low Channel 5755 MHz	36.367 MHz	500 kHz	Pass
High Channel 5795 MHz	36.001 MHz	500 kHz	Pass

*Jonathan Kiefer*

Tested By

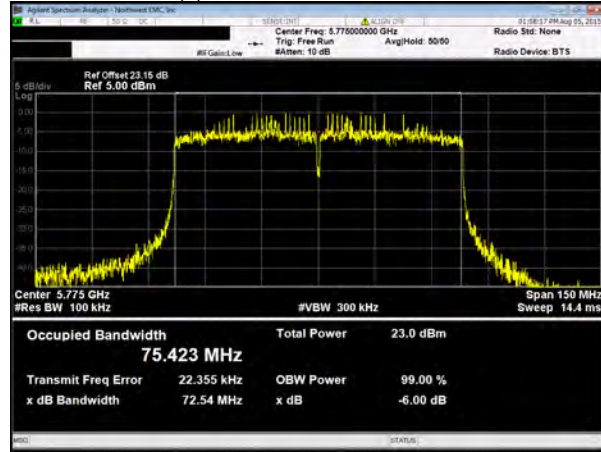
# EMISSION & OCCUPIED BANDWIDTH

Chain B, 802.11(n) HT, MCS0, 80 MHz, Low Channel 5210 MHz



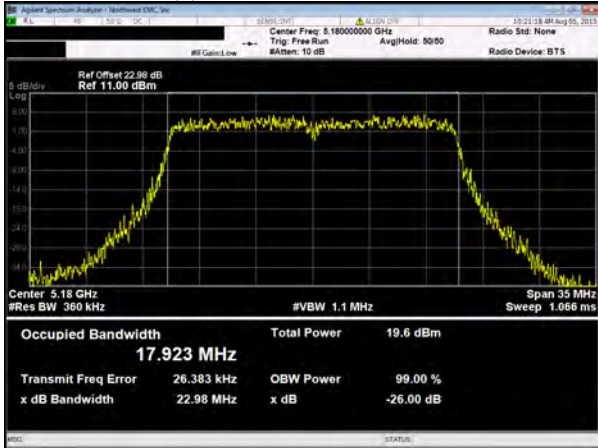
Value	86.623 MHz
Limit (>)	N/A
Result	N/A

Chain B, 802.11(n) HT, MCS0, 80 MHz, Low Channel 5775 MHz



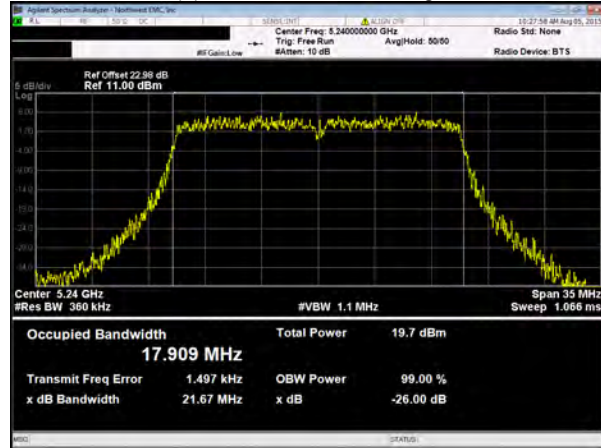
Value	72.542 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(n) HT, MCS8, 20 MHz, Low Channel 5180 MHz



Value	22.982 MHz
Limit (>)	N/A
Result	N/A

Chain B, 802.11(n) HT, MCS8, 20 MHz, High Channel 5240 MHz

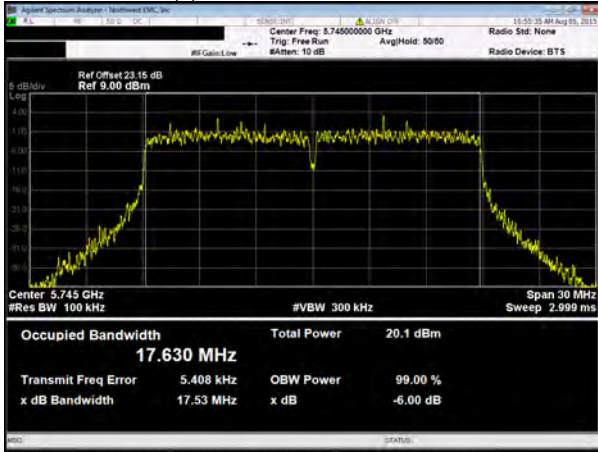


Value	21.666 MHz
Limit (>)	N/A
Result	N/A



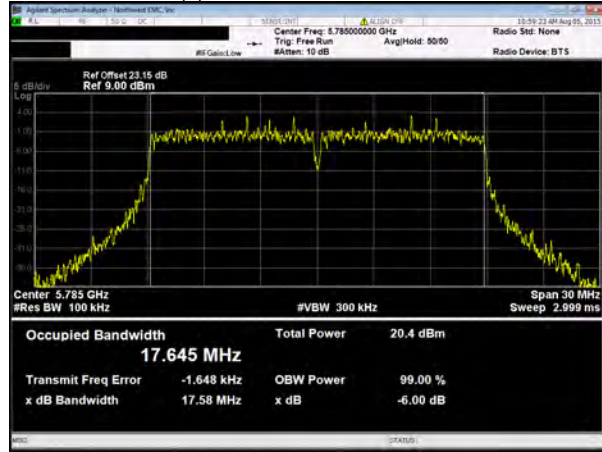
# EMISSION & OCCUPIED BANDWIDTH

Chain B, 802.11(n) HT, MCS8, 20 MHz, Low Channel 5745 MHz



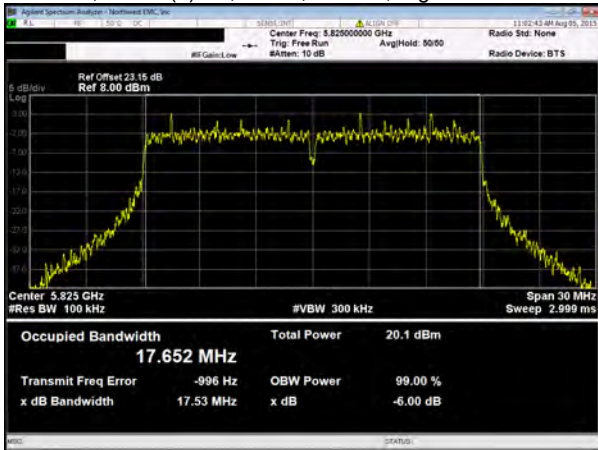
Value	17.529 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(n) HT, MCS8, 20 MHz, Mid Channel 5785 MHz



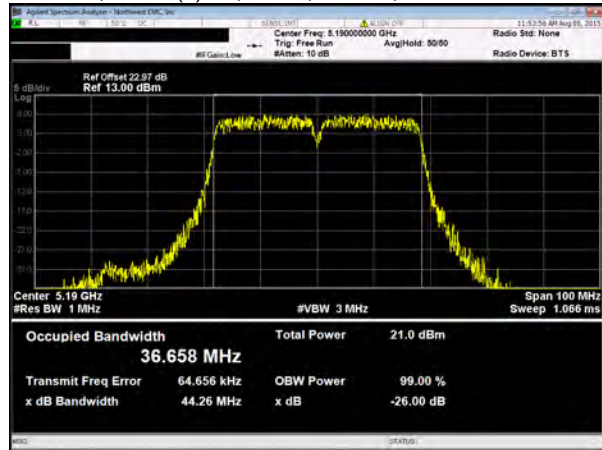
Value	17.579 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(n) HT, MCS8, 20 MHz, High Channel 5825 MHz



Value	17.533 MHz
Limit (>)	500 kHz
Result	Pass

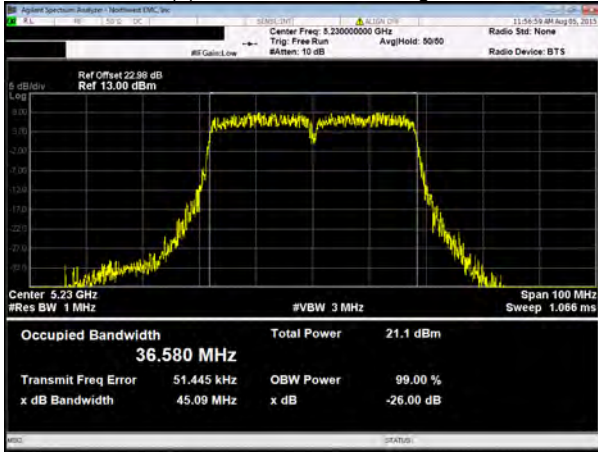
Chain B, 802.11(n) HT, MCS8, 40 MHz, Low Channel 5190 MHz



Value	44.258 MHz
Limit (>)	N/A
Result	N/A

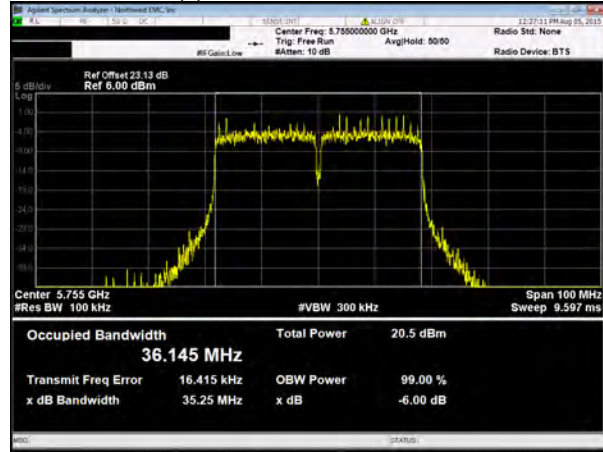
# EMISSION & OCCUPIED BANDWIDTH

Chain B, 802.11(n) HT, MCS8, 40 MHz, High Channel 5230 MHz



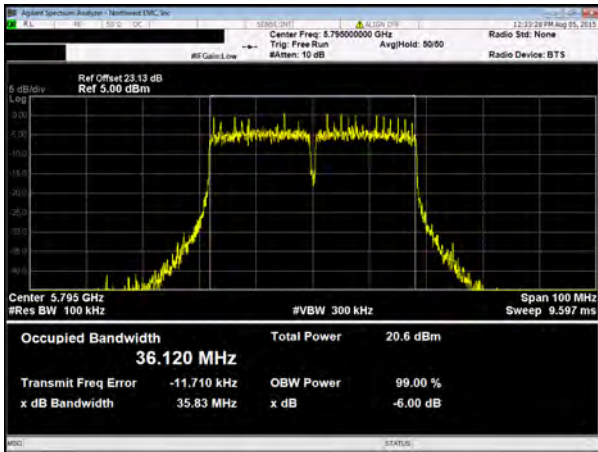
Value	45.09 MHz
Limit (>)	N/A
Result	N/A

Chain B, 802.11(n) HT, MCS8, 40 MHz, Low Channel 5755 MHz



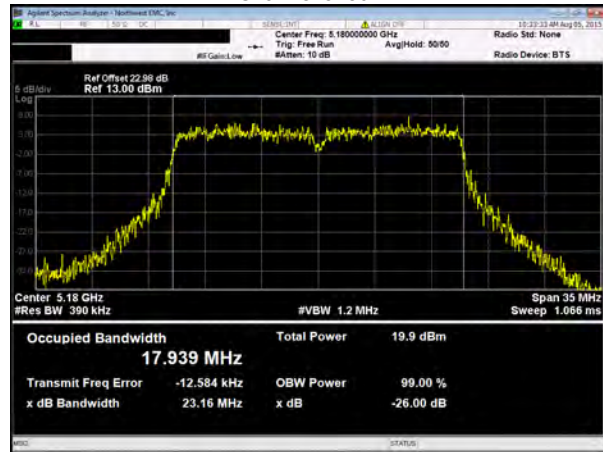
Value	35.253 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(n) HT, MCS8, 40 MHz, High Channel 5795 MHz



Value	35.828 MHz
Limit (>)	500 kHz
Result	Pass

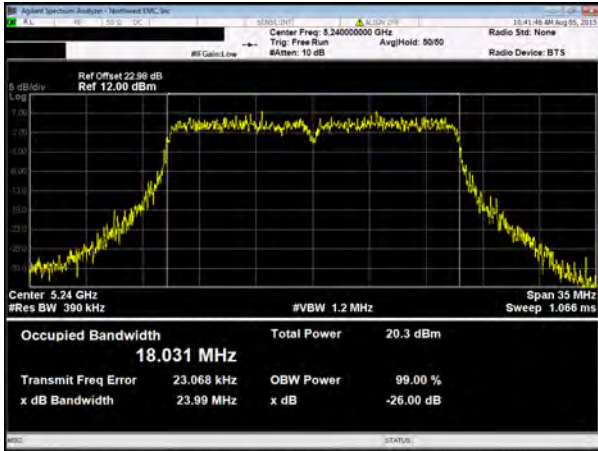
Chain B, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, Low Channel 5180 MHz



Value	23.156 MHz
Limit (>)	N/A
Result	N/A

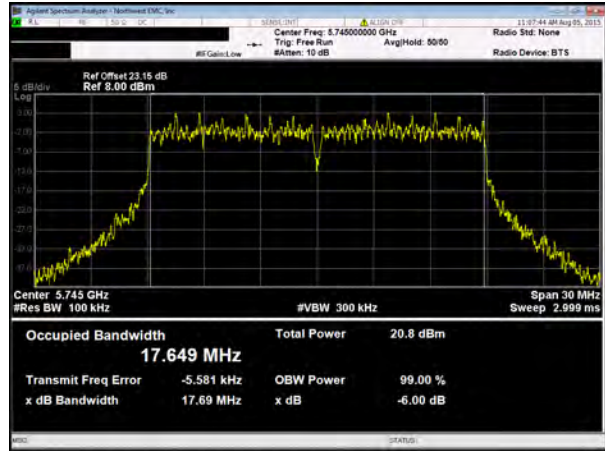
# EMISSION & OCCUPIED BANDWIDTH

Chain B, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, High Channel 5240 MHz



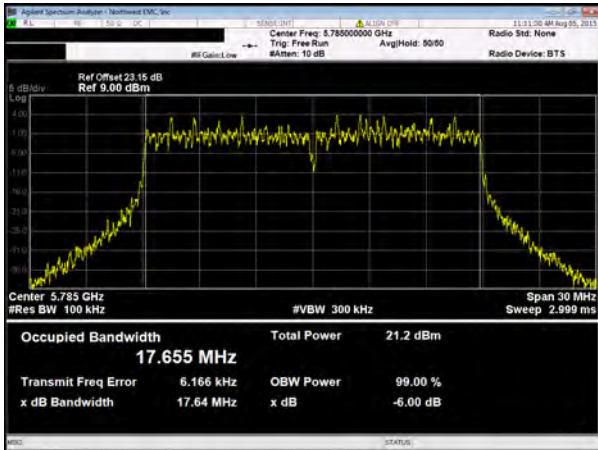
Value	23.992 MHz
Limit (>)	N/A
Result	N/A

Chain B, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, Low Channel 5745 MHz



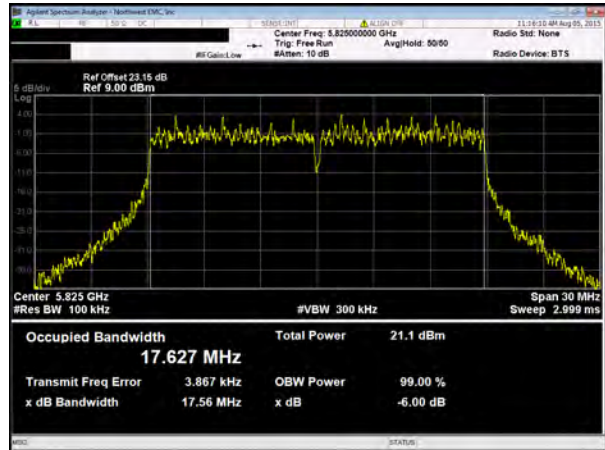
Value	17.691 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, Mid Channel 5785 MHz



Value	17.64 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, High Channel 5825 MHz

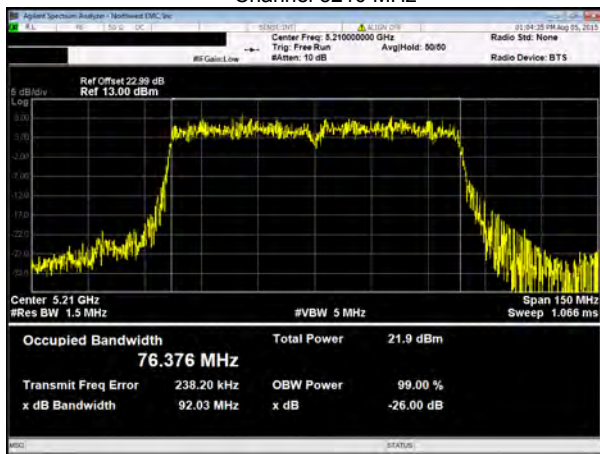


Value	17.564 MHz
Limit (>)	500 kHz
Result	Pass



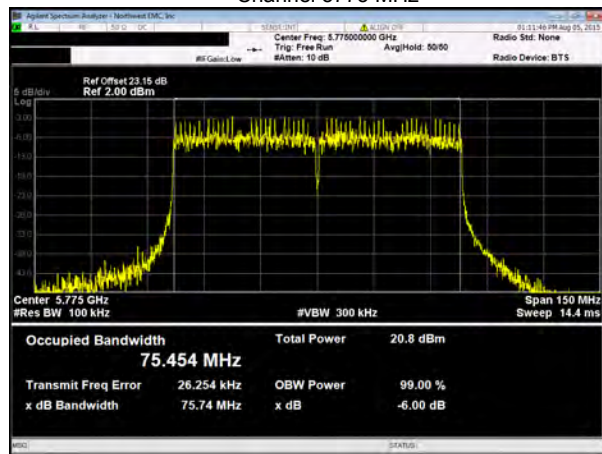
# EMISSION & OCCUPIED BANDWIDTH

Chain B, 802.11(ac) VHT, MCS9 (256-QAM), 80 MHz, Low Channel 5210 MHz



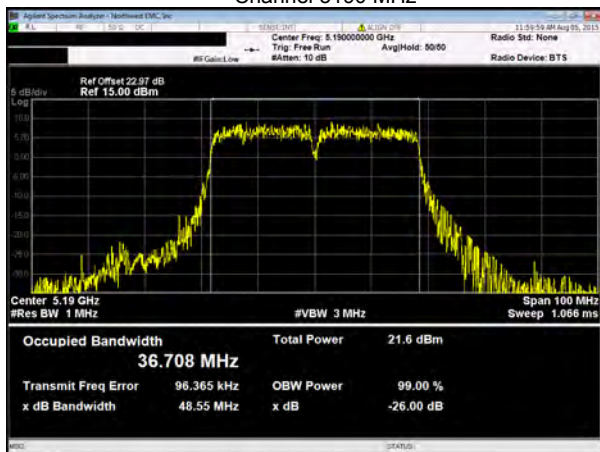
Value	92.029 MHz
Limit (>)	N/A
Result	N/A

Chain B, 802.11(ac) VHT, MCS9 (256-QAM), 80 MHz, Low Channel 5775 MHz



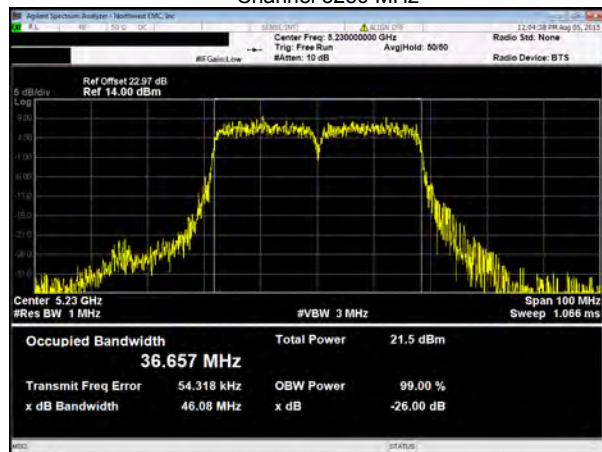
Value	75.745 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, Low Channel 5190 MHz



Value	48.552 MHz
Limit (>)	N/A
Result	N/A

Chain B, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, High Channel 5230 MHz

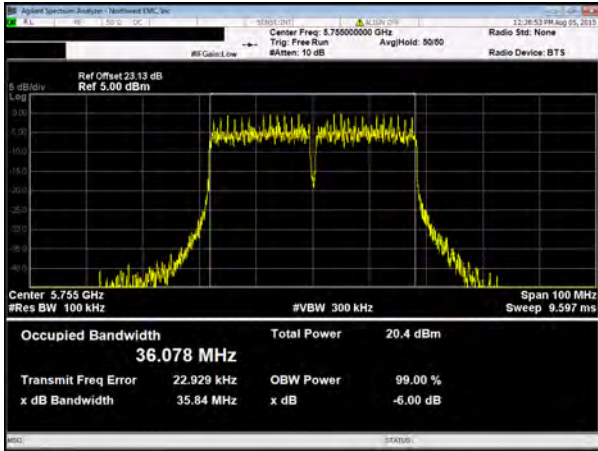


Value	46.078 MHz
Limit (>)	N/A
Result	N/A



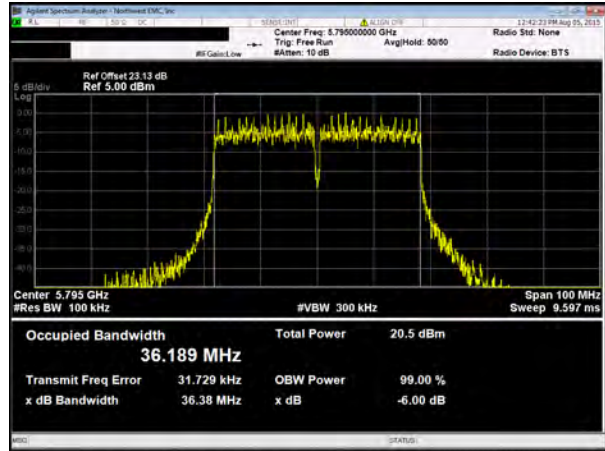
# EMISSION & OCCUPIED BANDWIDTH

Chain B, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, Low Channel 5755 MHz



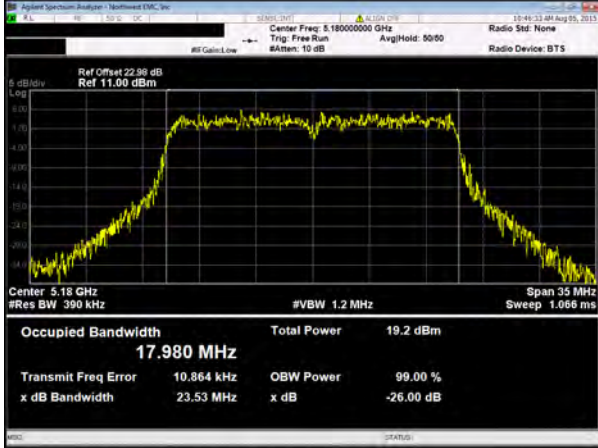
Value	35.837 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, High Channel 5795 MHz



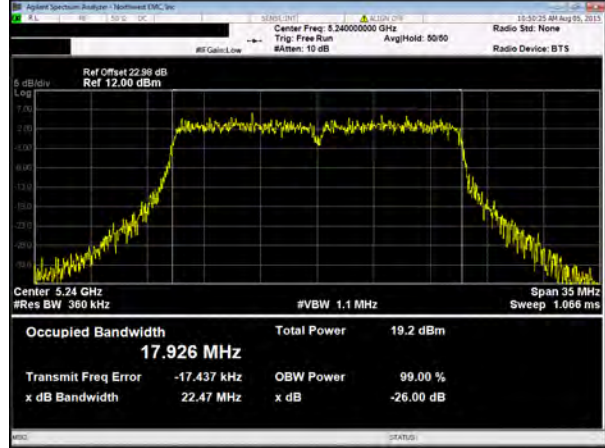
Value	36.376 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(n) HT, MCS15, 20 MHz, Low Channel 5180 MHz



Value	23.533 MHz
Limit (>)	N/A
Result	N/A

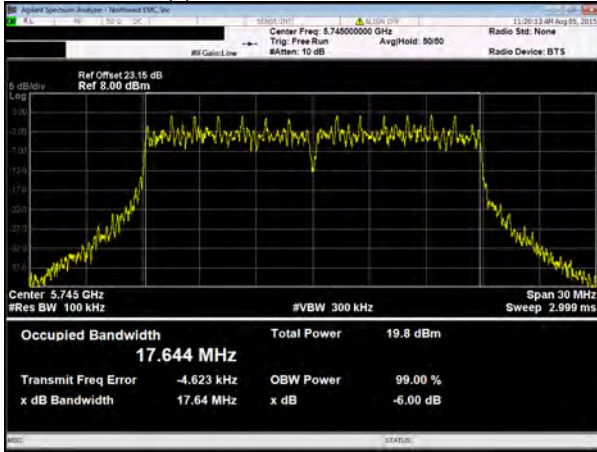
Chain B, 802.11(n) HT, MCS15, 20 MHz, High Channel 5240 MHz



Value	22.474 MHz
Limit (>)	N/A
Result	N/A

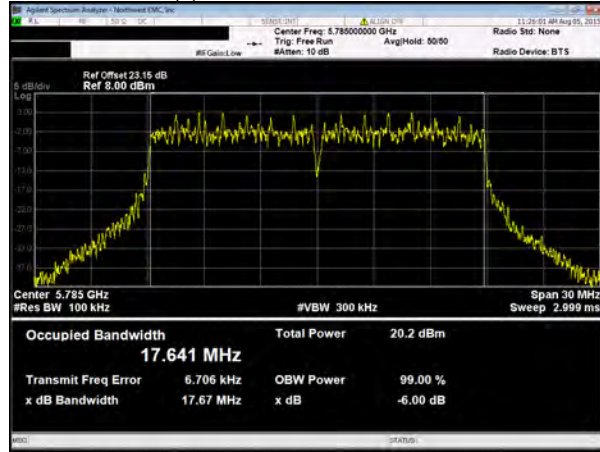
# EMISSION & OCCUPIED BANDWIDTH

Chain B, 802.11(n) HT, MCS15, 20 MHz, Low Channel 5745 MHz



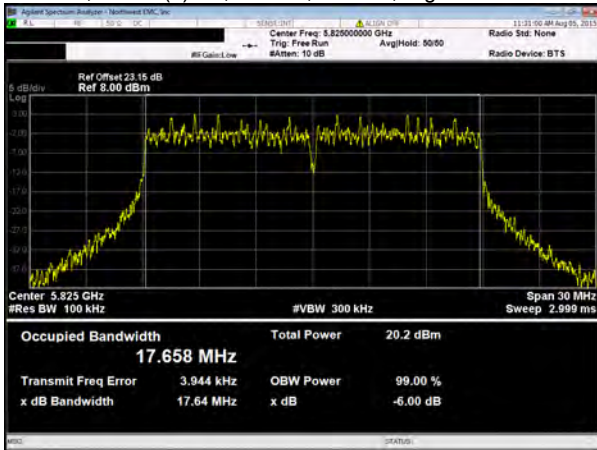
Value	17.636 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(n) HT, MCS15, 20 MHz, Mid Channel 5785 MHz



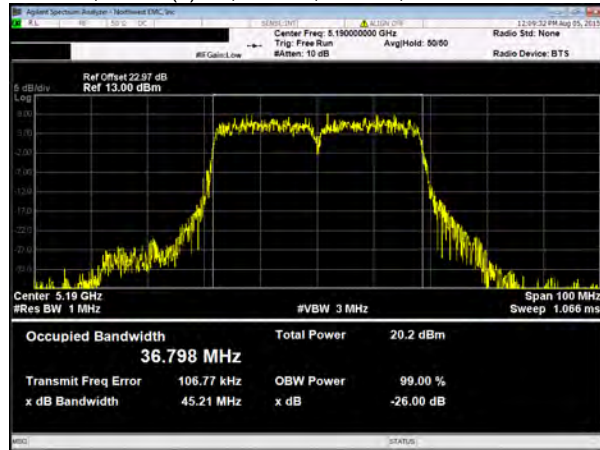
Value	17.671 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(n) HT, MCS15, 20 MHz, High Channel 5825 MHz



Value	17.636 MHz
Limit (>)	500 kHz
Result	Pass

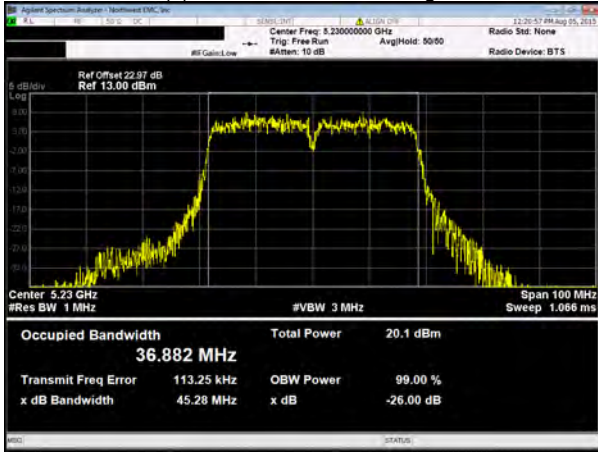
Chain B, 802.11(n) HT, MCS15, 40 MHz, Low Channel 5190 MHz



Value	45.215 MHz
Limit (>)	N/A
Result	N/A

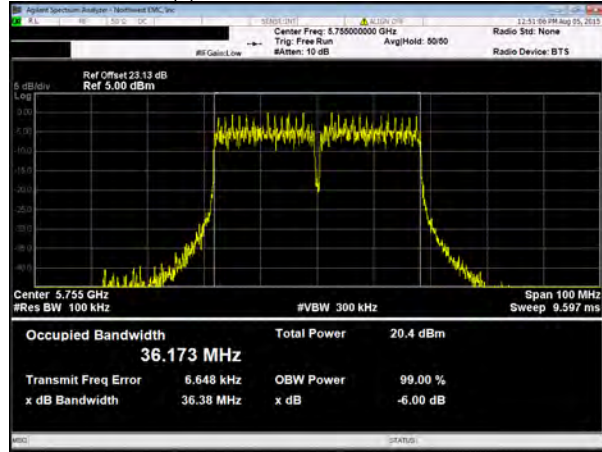
# EMISSION & OCCUPIED BANDWIDTH

Chain B, 802.11(n) HT, MCS15, 40 MHz, High Channel 5230 MHz



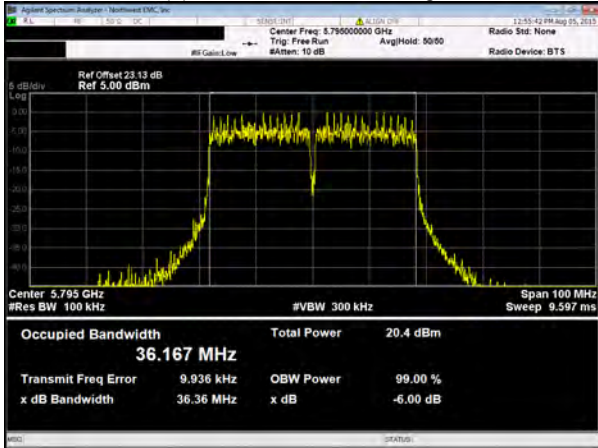
Value	45.285 MHz
Limit (>)	N/A
Result	N/A

Chain B, 802.11(n) HT, MCS15, 40 MHz, Low Channel 5755 MHz



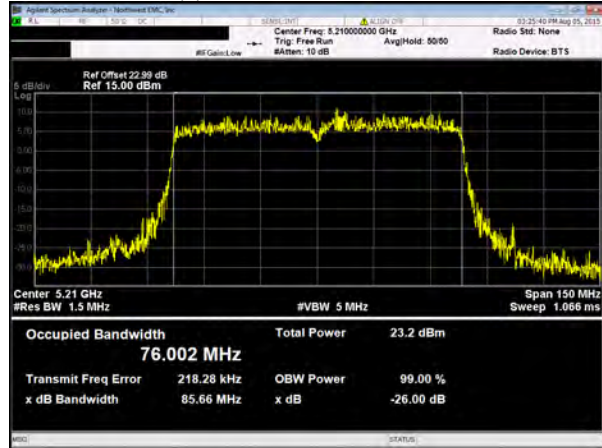
Value	36.377 MHz
Limit (>)	500 kHz
Result	Pass

Chain B, 802.11(n) HT, MCS15, 40 MHz, High Channel 5795 MHz



Value	36.364 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(n) HT, MCS0, 80 MHz, Low Channel 5210 MHz

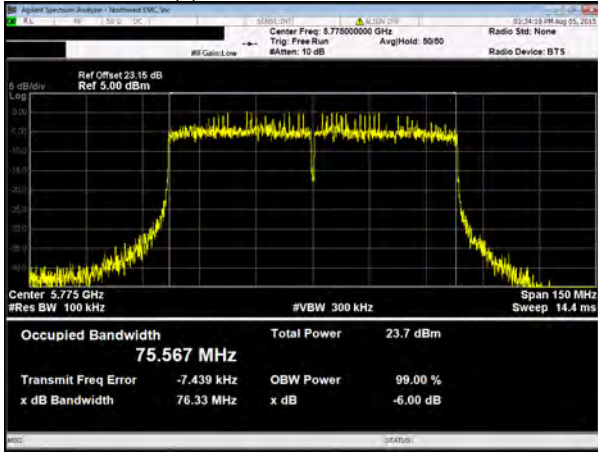


Value	85.662 MHz
Limit (>)	N/A
Result	N/A



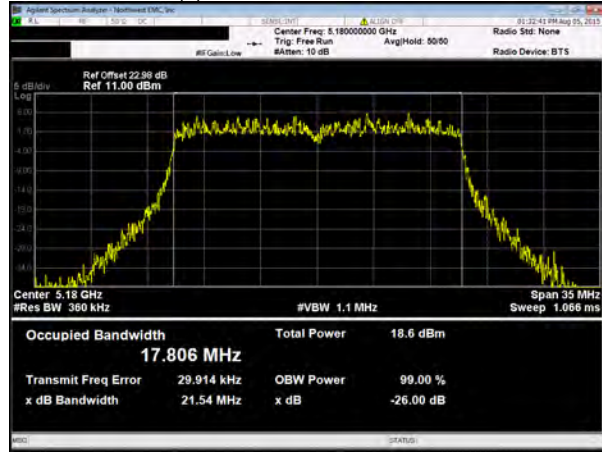
# EMISSION & OCCUPIED BANDWIDTH

Chain C, 802.11(n) HT, MCS0, 80 MHz, Low Channel 5775 MHz



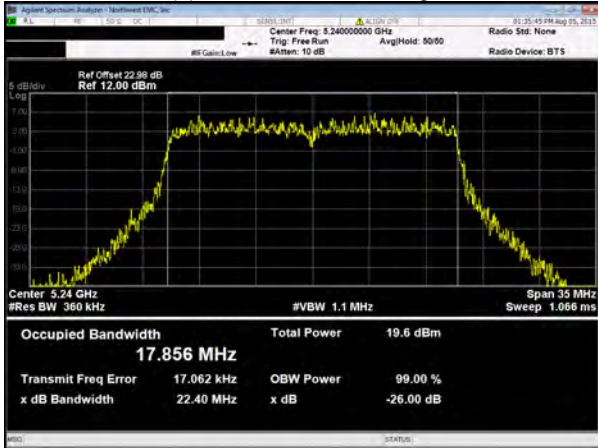
Value	76.33 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(n) HT, MCS8, 20 MHz, Low Channel 5180 MHz



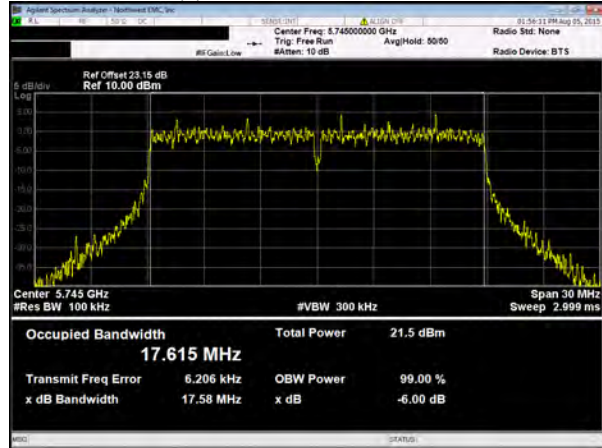
Value	21.545 MHz
Limit (>)	N/A
Result	N/A

Chain C, 802.11(n) HT, MCS8, 20 MHz, High Channel 5240 MHz



Value	22.397 MHz
Limit (>)	N/A
Result	N/A

Chain C, 802.11(n) HT, MCS8, 20 MHz, Low Channel 5745 MHz

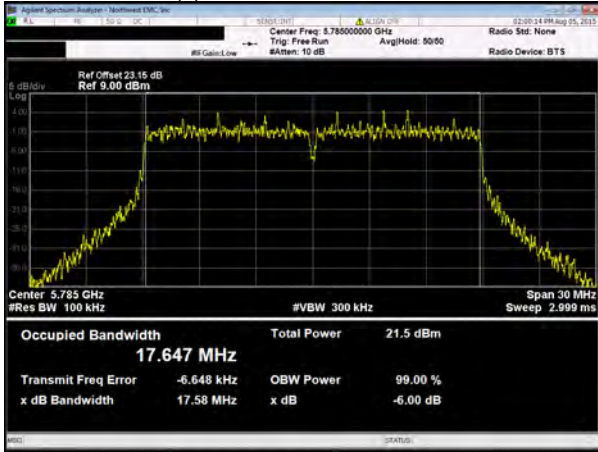


Value	17.577 MHz
Limit (>)	500 kHz
Result	Pass



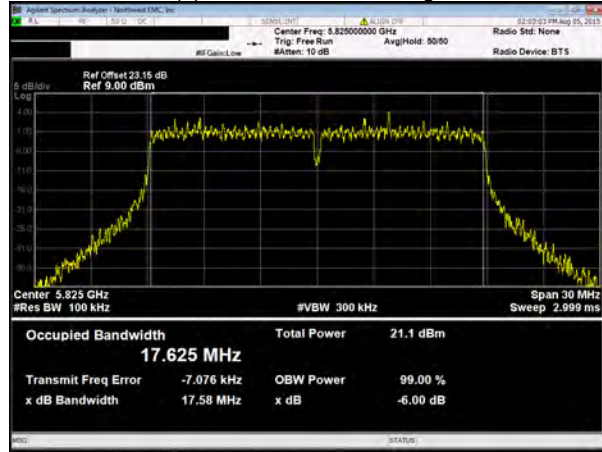
# EMISSION & OCCUPIED BANDWIDTH

Chain C, 802.11(n) HT, MCS8, 20 MHz, Mid Channel 5785 MHz



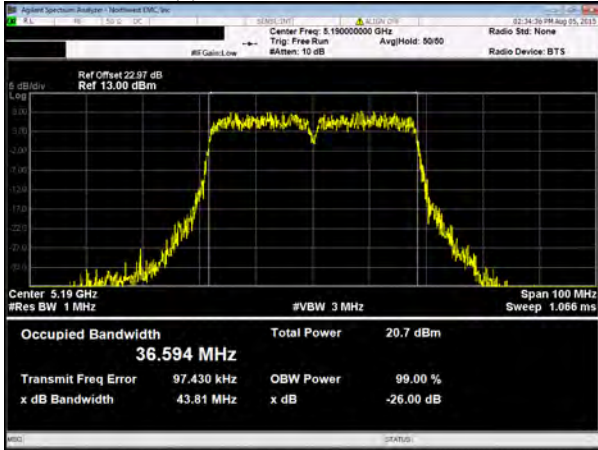
Value	17.583 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(n) HT, MCS8, 20 MHz, High Channel 5825 MHz



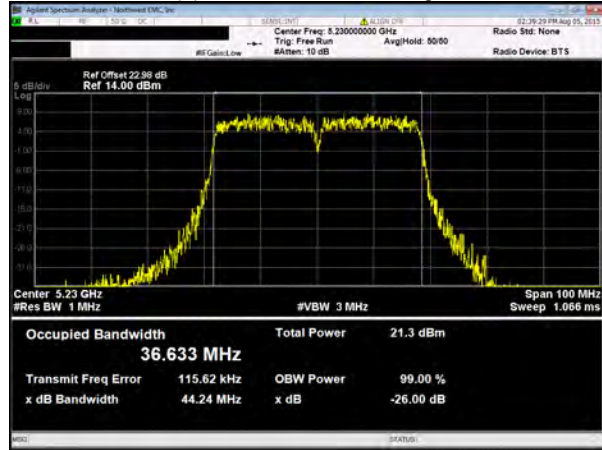
Value	17.584 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(n) HT, MCS8, 40 MHz, Low Channel 5190 MHz



Value	43.807 MHz
Limit (>)	N/A
Result	N/A

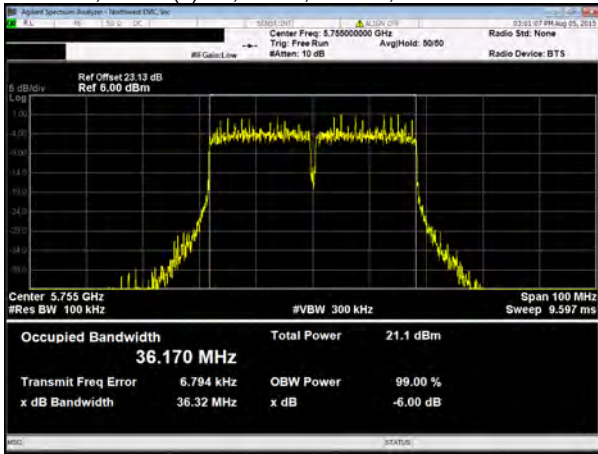
Chain C, 802.11(n) HT, MCS8, 40 MHz, High Channel 5230 MHz



Value	44.236 MHz
Limit (>)	N/A
Result	N/A

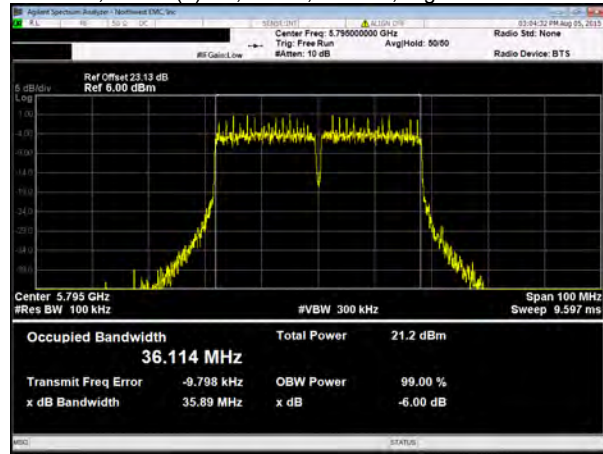
# EMISSION & OCCUPIED BANDWIDTH

Chain C, 802.11(n) HT, MCS8, 40 MHz, Low Channel 5755 MHz



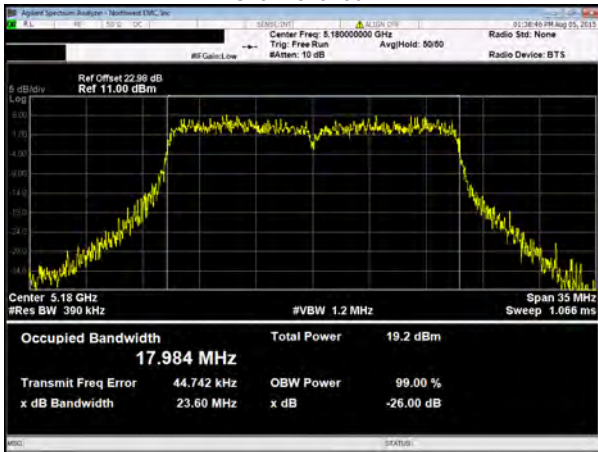
Value	36.318 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(n) HT, MCS8, 40 MHz, High Channel 5795 MHz



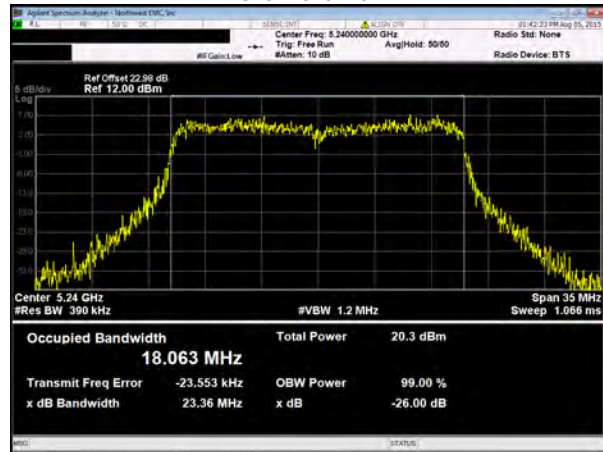
Value	35.89 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, Low Channel 5180 MHz



Value	23.603 MHz
Limit (>)	N/A
Result	N/A

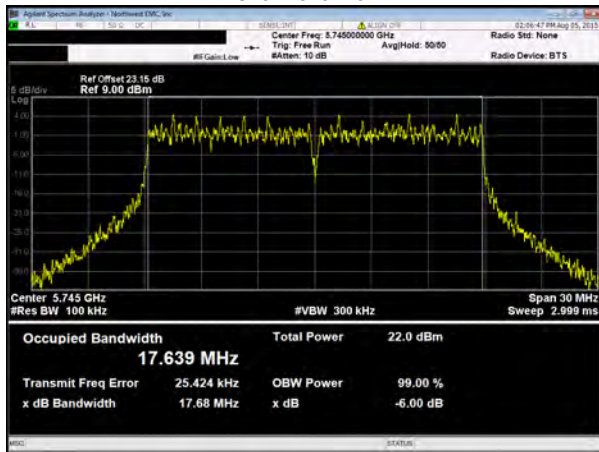
Chain C, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, High Channel 5240 MHz



Value	23.363 MHz
Limit (>)	N/A
Result	N/A

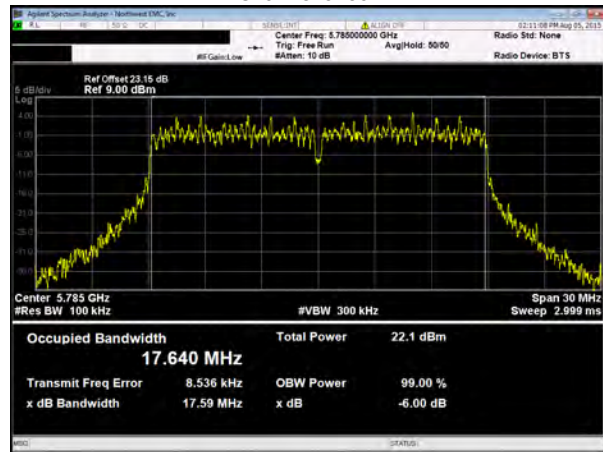
# EMISSION & OCCUPIED BANDWIDTH

Chain C, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, Low Channel 5745 MHz



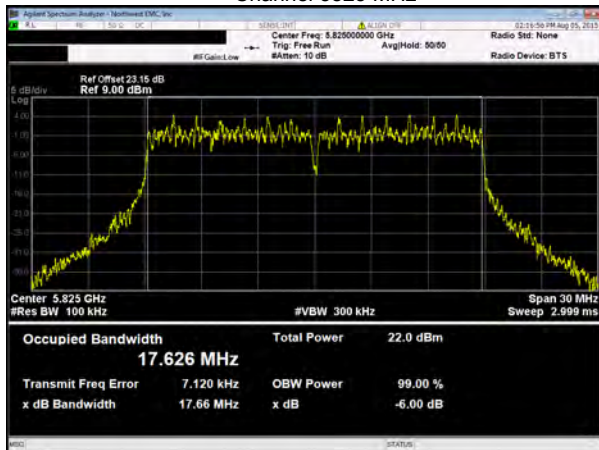
Value	17.679 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, Mid Channel 5785 MHz



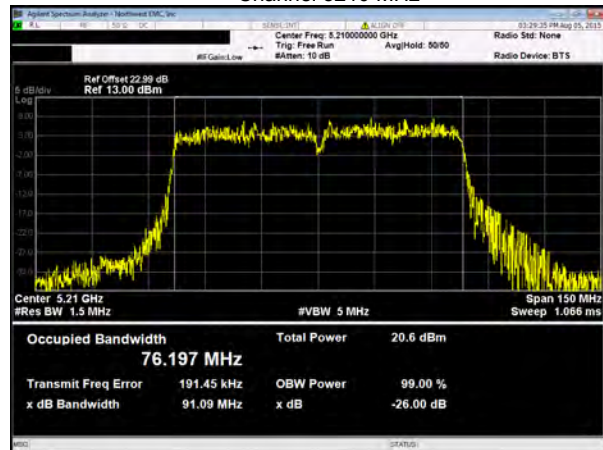
Value	17.591 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(ac) VHT, MCS8 (256-QAM), 20 MHz, High Channel 5825 MHz



Value	17.659 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(ac) VHT, MCS9 (256-QAM), 80 MHz, Low Channel 5210 MHz

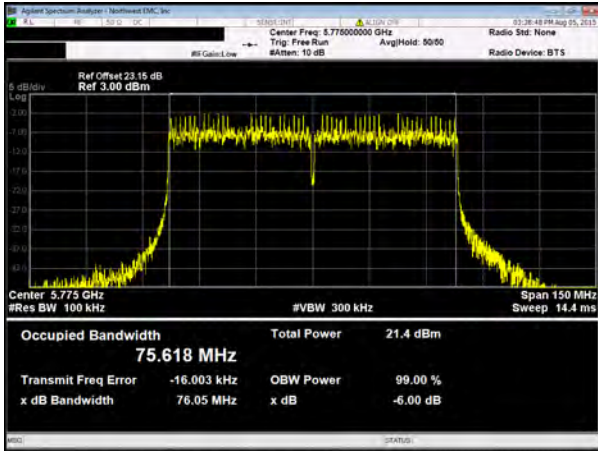


Value	91.086 MHz
Limit (>)	N/A
Result	N/A



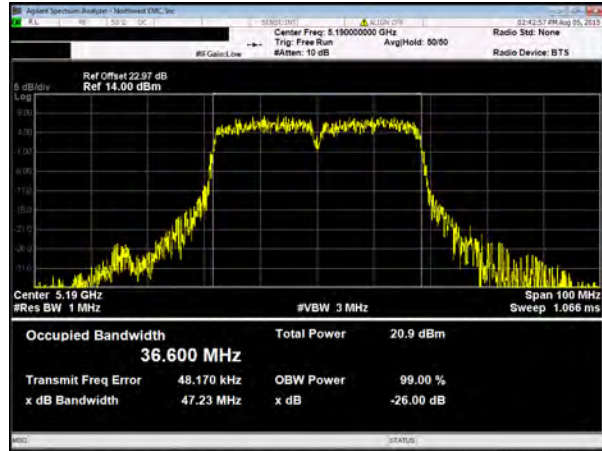
# EMISSION & OCCUPIED BANDWIDTH

Chain C, 802.11(ac) VHT, MCS9 (256-QAM), 80 MHz, Low Channel 5775 MHz



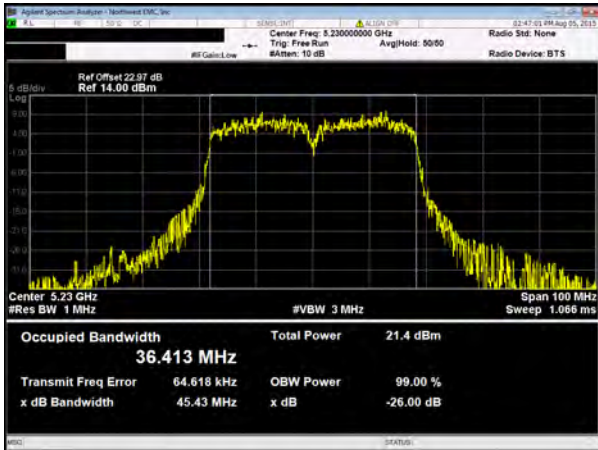
Value	76.055 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, Low Channel 5190 MHz



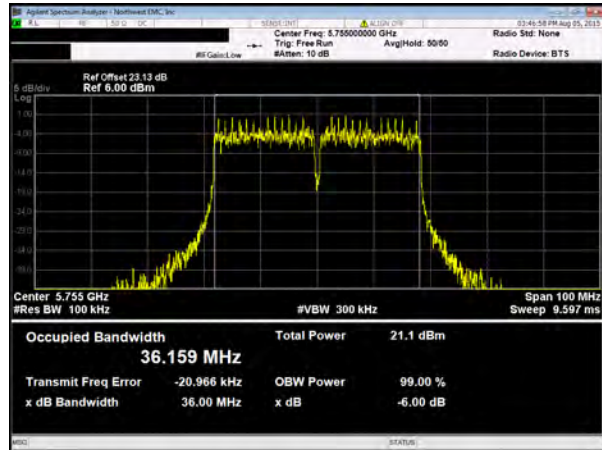
Value	47.234 MHz
Limit (>)	N/A
Result	N/A

Chain C, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, High Channel 5230 MHz



Value	45.425 MHz
Limit (>)	N/A
Result	N/A

Chain C, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, Low Channel 5755 MHz

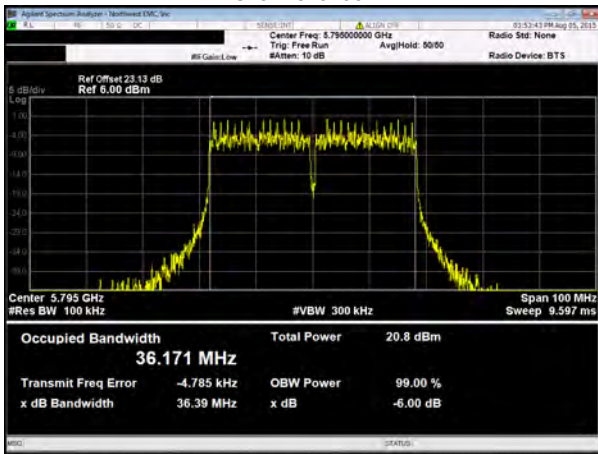


Value	35.996 MHz
Limit (>)	500 kHz
Result	Pass



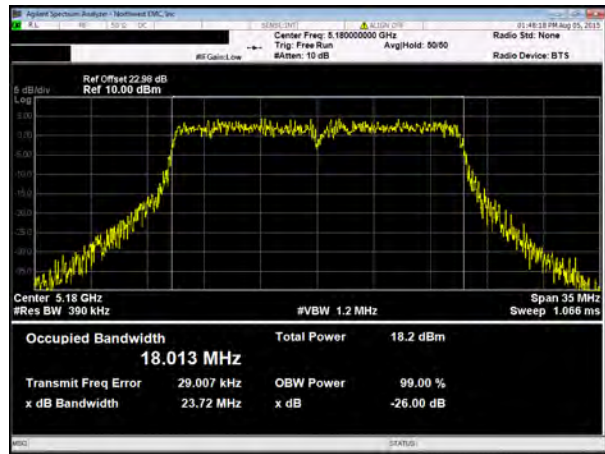
# EMISSION & OCCUPIED BANDWIDTH

Chain C, 802.11(ac) VHT, MCS9 (256-QAM), 40 MHz, High Channel 5795 MHz



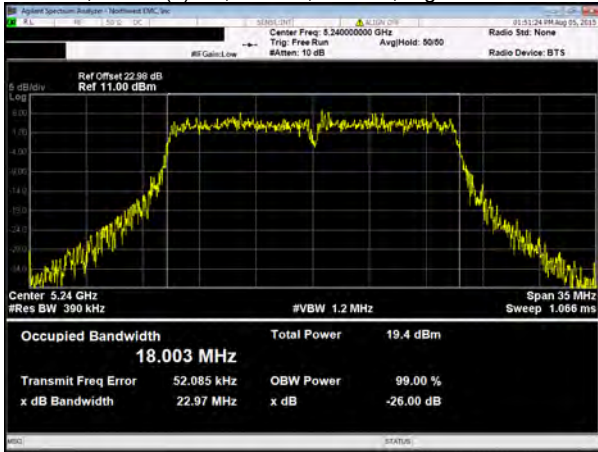
Value	36.395 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(n) HT, MCS15, 20 MHz, Low Channel 5180 MHz



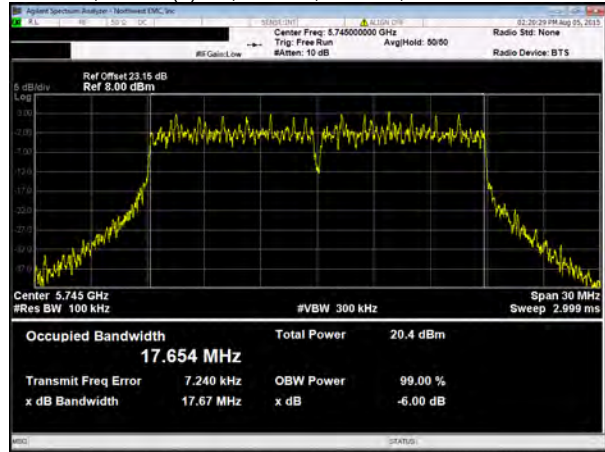
Value	23.716 MHz
Limit (>)	N/A
Result	N/A

Chain C, 802.11(n) HT, MCS15, 20 MHz, High Channel 5240 MHz



Value	22.973 MHz
Limit (>)	N/A
Result	N/A

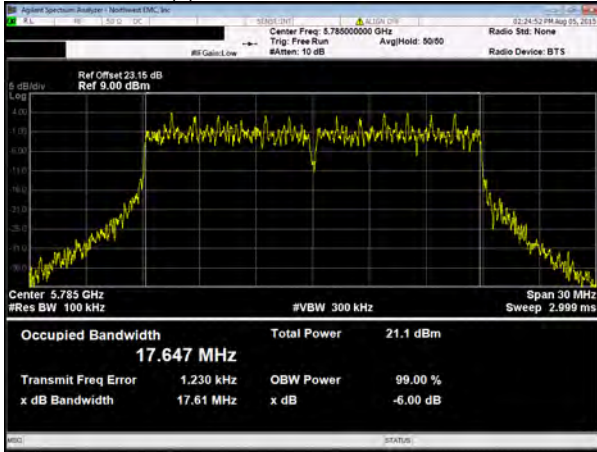
Chain C, 802.11(n) HT, MCS15, 20 MHz, Low Channel 5745 MHz



Value	17.671 MHz
Limit (>)	500 kHz
Result	Pass

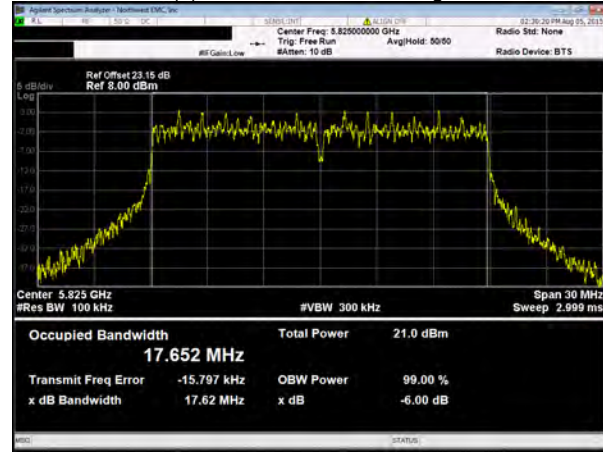
# EMISSION & OCCUPIED BANDWIDTH

Chain C, 802.11(n) HT, MCS15, 20 MHz, Mid Channel 5785 MHz



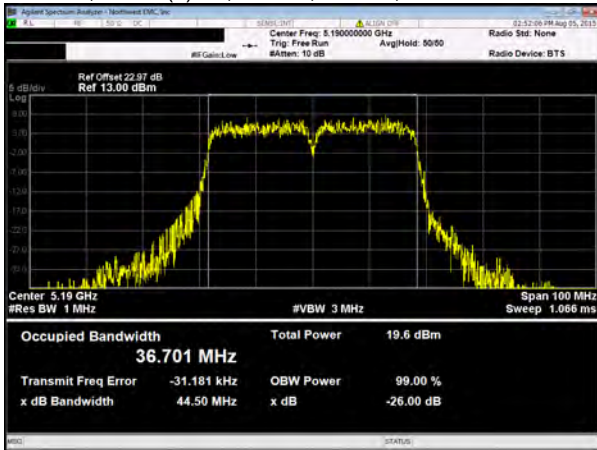
Value	17.609 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(n) HT, MCS15, 20 MHz, High Channel 5825 MHz



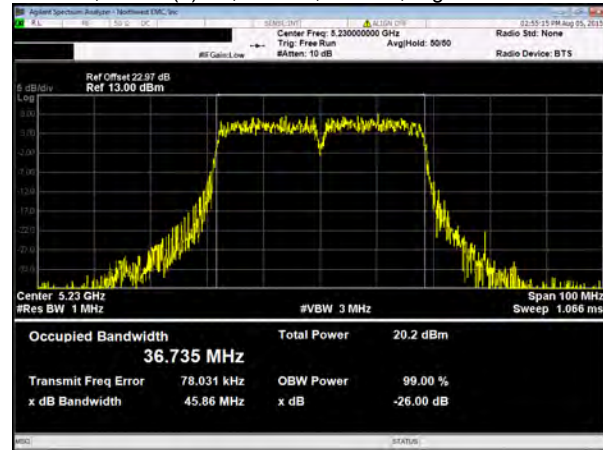
Value	17.62 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(n) HT, MCS15, 40 MHz, Low Channel 5190 MHz



Value	44.497 MHz
Limit (>)	N/A
Result	N/A

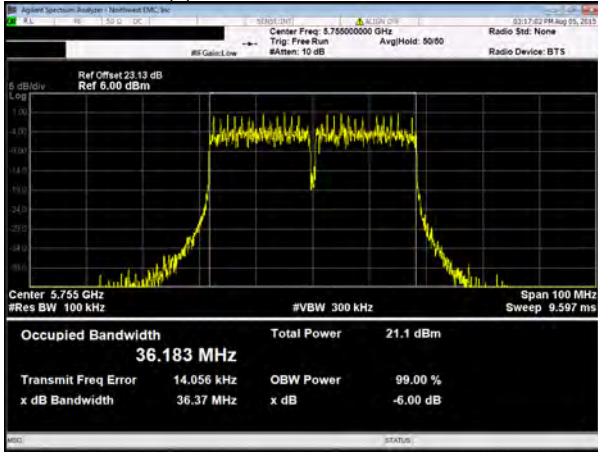
Chain C, 802.11(n) HT, MCS15, 40 MHz, High Channel 5230 MHz



Value	45.861 MHz
Limit (>)	N/A
Result	N/A

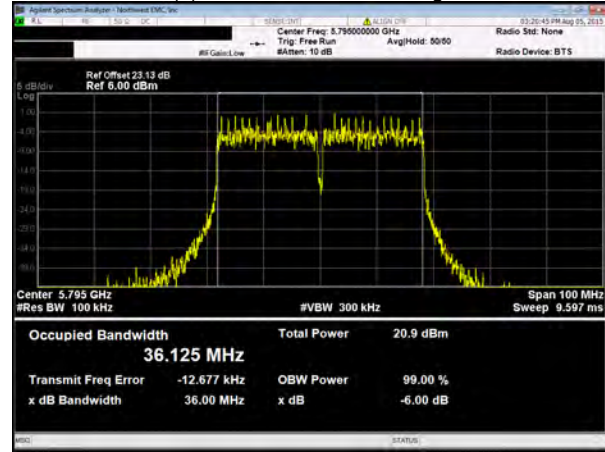
# EMISSION & OCCUPIED BANDWIDTH

Chain C, 802.11(n) HT, MCS15, 40 MHz, Low Channel 5755 MHz



Value	36.367 MHz
Limit (>)	500 kHz
Result	Pass

Chain C, 802.11(n) HT, MCS15, 40 MHz, High Channel 5795 MHz



Value	36.001 MHz
Limit (>)	500 kHz
Result	Pass