

# RF TEST REPORT



Report No.: RF\_FCC\_IC\_SL18071803-SEV-034A2\_W5258  
Supersede Report No.:

Applicant	:	ChargePoint, Inc.
Product Name	:	WLAN module
Model No.	:	241083S
Test Standard	:	47 CFR 15.407 RSS-247 Issue 2, February 2017
Test Method	:	ANSI C63.10: 2013 789033 D02 General U-NII Test Procedures New Rules v02r01 RSS-Gen Issue 5, Apr 2018
FCC ID	:	W38-241083S
IC ID	:	8854A-241083S
Dates of test	:	12/04/2018 to 12/12/2018
Issue Date	:	12/13/2018
Test Result	:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
Equipment complied with the specification	[X]	
Equipment did not comply with the specification	[ ]	

This Test Report is Issued Under the Authority of:

<i>Gary Chou</i>	<i>Chen Ge</i>
Gary Chou Test Engineer	Chen Ge Engineer Reviewer
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Issued By:  
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## Laboratory Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.



In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

### Accreditations for Conformity Assessment

Country/Region	Accreditation Body	Scope
USA	FCC, A2LA	EMC, RF/Wireless, Telecom
Canada	IC, A2LA, NIST	EMC, RF/Wireless, Telecom
Taiwan	BSMI, NCC, NIST	EMC, RF, Telecom, Safety
Hong Kong	OFTA, NIST	RF/Wireless, Telecom
Australia	NATA, NIST	EMC, RF, Telecom, Safety
Korea	KCC/RRA, NIST	EMI, EMS, RF, Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	Safety, EMC, RF/Wireless, Telecom
Europe	A2LA, NIST	EMC, RF, Telecom, Safety
Israel	MOC, NIST	EMC, RF, Telecom, Safety

### Accreditations for Product Certifications

Country	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC, RF, Telecom
Canada	IC FCB, NIST	EMC, RF, Telecom
Singapore	iDA, NIST	EMC, RF, Telecom
EU	NB	EMC & R&TTE Directive
Japan	MIC (RCB 208)	RF, Telecom
Hong Kong	OFTA (US002)	RF, Telecom

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## 1 Report Revision History

Report No.	Report Version	Description	Issue Date
RF_FCC_SL18071803-SEV-034A2_W5258	None	Original	12/13/2018

## 2 Executive Summary

The purpose of this test program was to demonstrate compliance of following product

Company: ChargePoint , Inc.  
Product: WLAN module  
Model: 241083S

against the current Stipulated Standards. The specified model product stated above has demonstrated compliance with the Stipulated Standard listed on 1<sup>st</sup> page.

## 3 Customer information

Applicant Name	:	ChargePoint, Inc.
Applicant Address	:	254 E. Hacienda Ave , Campbell, CA 95008
Manufacturer Name	:	ChargePoint, Inc.
Manufacturer Address	:	254 E. Hacienda Ave , Campbell, CA 95008

## 4 Test site information

Lab performing tests	SIEMIC Laboratories
Lab Address	775 Montague Expressway, Milpitas, CA 95035
FCC Test Site No.	540430
IC Test Site No.	4842D-2
VCCI Test Site No.	A0133

## 5 Modification

Index	Item	Description	Note
-	-	-	-

## 6 EUT Information

### 6.1 EUT Description

Product Name	WLAN module
Model No.	241083S
Trade Name	ChargePoint
Serial No.	183560A03817
Input Power	120Vac/ 60Hz
Date of EUT received	12/02/2018
Equipment Class/ Category	Wideband transmission system
Port/Connectors	1X USB Port, 1X Console Port

### 6.2 Radio Description

Radio Type	802.11a/n20	802.11n40
Operating Frequency	5180-5240MHz 5745-5825MHz	5190-5230MHz 5755-5795MHz
Modulation	OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Channel Spacing	20MHz	40MHz
Number of Channels	9	4
Antenna Type	PIFA	
Antenna Gain (Peak)	5GHz: 3.5 dBi	
Note	-	

### EUT Power level setting

Mode	Frequency	ART Power Setting
802.11-a	5180	20
802.11-a	5200	20
802.11-a	5240	20
802.11 n20	5180	18
802.11 n20	5200	18
802.11 n20	5240	18
802.11 n40	5190	18
802.11 n40	5230	18
<hr/>		
802.11-a	5745	20
802.11-a	5785	20
802.11-a	5825	20
802.11 n20	5745	20
802.11 n20	5785	20
802.11 n20	5825	20
802.11 n20	5755	20
802.11 n20	5795	20

## 7 Supporting Equipment/Software and cabling Description

### 7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Laptop	PP01L Latitude E5440	F1WPF12	Dell	-
2	Adaptor	DKI10FB	DKI10FB	OPEN PEAK	-

### 7.2 Cabling Description

Name	Connection Start		Connection Stop		Length / shielding Info		Note
	From	I/O Port	To	I/O Port	Length (m)	Shielding	
USB	EUT	I/O Port	Laptop	USB	10	Unshielded	-

### 7.3 Test Software Description

Test Item	Software	Description
RF Testing	Putty	Set the EUT connect to Laptop
RF Testing	Labtool	Set the EUT to transmit continuously in different test modes and channels

## 8 Test Summary

Test Item	Test standard		Test Method/Procedure	Pass / Fail
Restricted Band of Operation	FCC	15.205	ANSI C63.10: 2013 789033 D02 General U-NII Test Procedures New Rules v02r01	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
	IC	RSS 247 (2.2)	RSS-Gen Issue 4, Nov 2014	<input type="checkbox"/> Pass <input type="checkbox"/> N/A
AC Conducted Emissions Voltage	FCC	15.207(a)	ANSI C63.10: 2013	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
	IC	RSS-Gen (8.8)	RSS-Gen Issue 5, Apr 2018	<input type="checkbox"/> Pass <input type="checkbox"/> N/A

Test Item	Test standard		Test Method/Procedure	Pass / Fail
26 & 6 dB Emission Bandwidth	FCC	15.407 (a)(2)	789033 D02 General U-NII Test Procedures New Rules v02r01	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
	IC	RSS 247 (6.2)		<input type="checkbox"/> Pass <input type="checkbox"/> N/A
99% Bandwidth	IC	RSS 247 (6.2)	RSS-Gen Issue 5, Apr 2018 (6.6)	<input type="checkbox"/> Pass <input type="checkbox"/> N/A
Maximum conducted Output Power	FCC	15.407 (a)(2)	789033 D02 General U-NII Test Procedures New Rules v02r01	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
	IC	RSS 247 (6.2)	RSS-Gen Issue 5, Apr 2018 (6.6)	<input type="checkbox"/> Pass <input type="checkbox"/> N/A
Power reduction (Antenna Gain > 6 dBi)	FCC	15.407 (a)(2)	-	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
Band Edge and Radiated Spurious Emissions	FCC	15.407 (b)(2), 15.407 (b)(6)	ANSI C63.10: 2013 789033 D02 General U-NII Test Procedures New Rules v02r01	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
	IC	RSS 247 (6.3)		<input type="checkbox"/> Pass <input type="checkbox"/> N/A
Power Spectral Density	FCC	15.407 (a)(2)	ANSI C63.10: 2013	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
	IC	RSS 247 (6.2)	789033 D02 General U-NII Test Procedures New Rules v02r01	<input type="checkbox"/> Pass <input type="checkbox"/> N/A
Frequency Stability	FCC	15.407 (g)	-	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
				<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
Transmit Power Control (TPC)	FCC	15.407 (h)(1)	-	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
Remark	1. All measurement uncertainties are not taken into consideration for all presented test result. 2. The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual.			

## 9 Measurement Uncertainty

### 9.1 Radiated Emissions (30MHz to 1GHz)

The test is to measure the radiated emissions of the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- NSA Calibration
- Etc., details see the below table

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Filter Insertion Loss	0.25	Normal	2	1	0.125
Antenna Factor	0.65	Normal	2	1	0.325
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.86605081
PRF Response	1.5	Rectangular	1.732	1	0.86605081
Mismatch Filter - Receiver	0.25	U-Shape	1.414	1	0.1768033
NSA Calibration	4.0	U-Shape	1.414	1	2.8288543
Combined Standard Uncertainty					3.0059131
<b>Expanded Uncertainty (K=2)</b>					<b>6.0118262</b>

The total derived measurement uncertainty is +/- 6.00 dB.

### 9.2 Radiated Emissions (1GHz to 40GHz)

The test is to measure the radiated emissions of the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- VSWR Calibration
- Etc., details see the below table

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.0692840
Cable Insertion Loss	0.21	Normal	2	1	0.1050000
Filter Insertion Loss	0.25	Normal	2	1	0.1250000
Antenna Factor	0.65	Normal	2	1	0.3250000
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.8660508
PRF Response	1.5	Rectangular	1.732	1	0.8660508
Mismatch Filter - Receiver	0.25	U-Shape	1.414	1	0.1768033
VSWR Calibration	2.0	U-Shape	1.414	1	1.4144272
Combined Standard Uncertainty					4.2363
<b>Expanded Uncertainty (K=2)</b>					<b>8.4726</b>

The total derived measurement uncertainty is +/- 8.47 dB.

### **9.3 RF conducted measurement**

The test is to measure the RF output power from the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the Reference Level Uncertainty
- Uncertainty of variable attenuators
- Uncertainty of cables
- Uncertainty due to the mismatches

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Reference Level	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Attenuator	0.25	Normal	2	1	0.125
Mismatch	0.25	U-Shape	1.414	1	0.1768033
Combined Standard Uncertainty					0.476087
<b>Expanded Uncertainty (K=2)</b>					<b>0.952174</b>

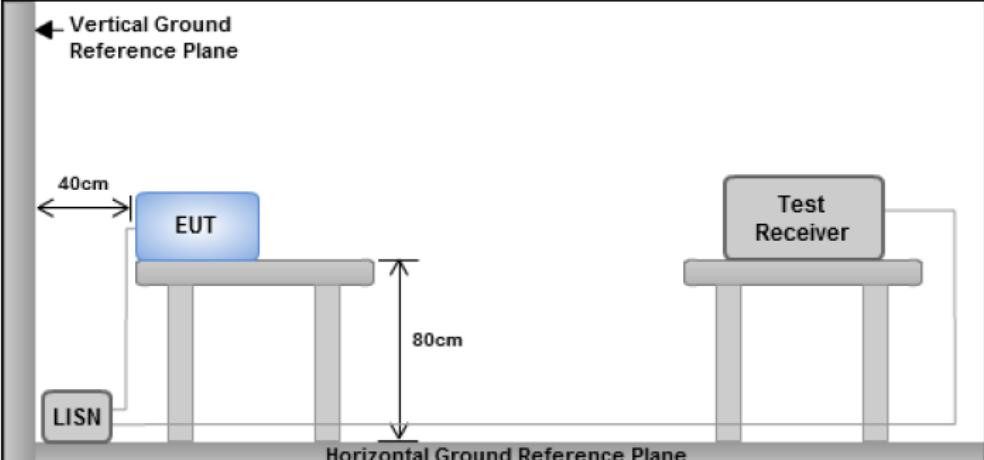
The total derived measurement uncertainty is +/- 0.95 dB.

## 10 Measurements, Examination and Derived Results

### 10.1 Conducted Emissions

#### Conducted Emission Limit

Frequency ranges (MHz)	Limit (dBuV)	
	QP	Average
0.15 ~ 0.5	66 – 56	56 – 46
0.5 ~ 5	56	46
5 ~ 30	60	50

Spec	Item	Requirement	Applicable
FCC 15.207 RSS-GEN Section 8.8	a)	For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 $\mu$ H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequency ranges.	<input checked="" type="checkbox"/>
Test Setup		 <p><b>Note:</b></p> <ol style="list-style-type: none"> <li>1. Support units were connected to second LISN.</li> <li>2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes</li> </ol>	
Procedure			<ul style="list-style-type: none"> <li>- The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table, as shown in Annex B.</li> <li>- The power supply for the EUT was fed through a 50<math>\Omega</math>/50<math>\mu</math>H EUT LISN, connected to filtered mains.</li> <li>- The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.</li> <li>- All other supporting equipment was powered separately from another main supply.</li> </ul>
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

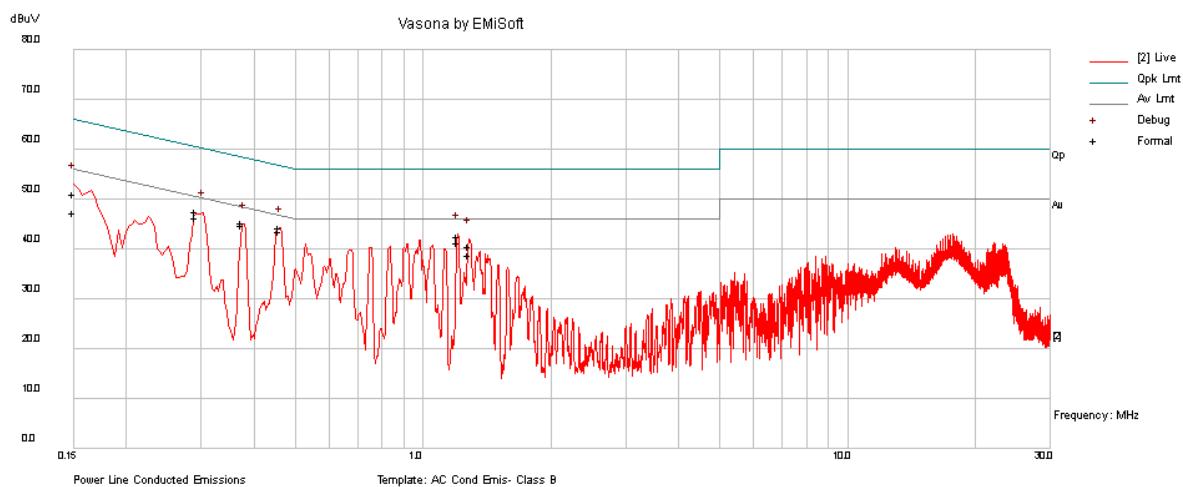
Test Data  Yes  N/A

Test Plot  Yes (See below)  N/A

Test was done by Gary Chou at Conducted Emission test site.

## Conducted Emission Test Results

Test specification:		Conducted Emissions		
Environmental Conditions:	Temp(°C):	21	Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
	Mains Power:	120 Vac/ 60Hz		
	Tested by:	Gary Chou		
	Test Date:	12/04/2018		
Remarks	Line			

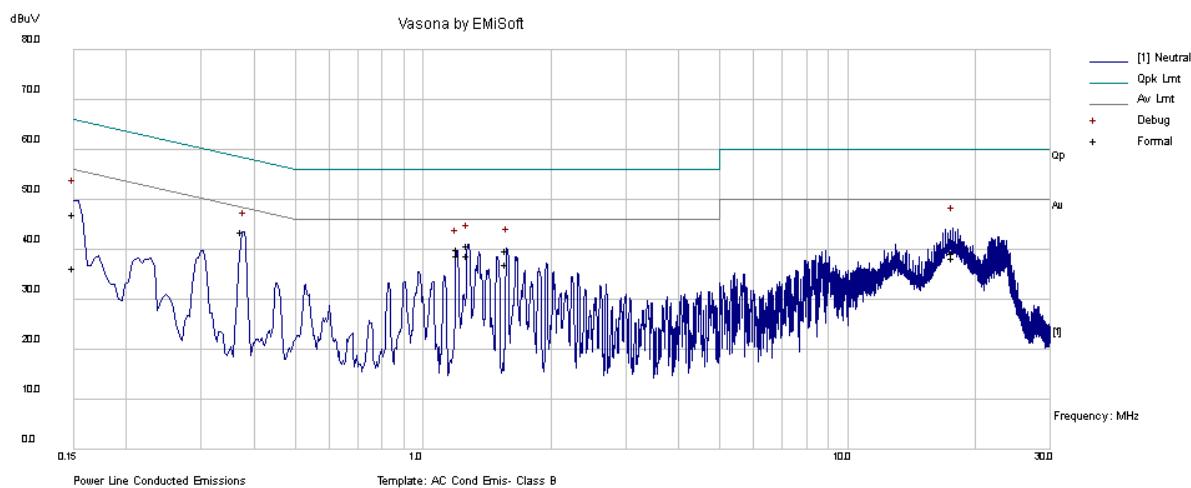


Live Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
0.46	34.99	9.33	0.04	44.36	Quasi Peak	Live	56.75	-12.39	Pass
0.29	38.19	9.32	0.04	47.56	Quasi Peak	Live	60.49	-12.93	Pass
0.15	41.7	9.33	0.05	51.08	Quasi Peak	Live	65.98	-14.9	Pass
1.20	33.32	9.33	0.05	42.7	Quasi Peak	Live	56	-13.3	Pass
0.37	35.91	9.33	0.04	45.28	Quasi Peak	Live	58.4	-13.12	Pass
1.28	31.09	9.34	0.05	40.47	Quasi Peak	Live	56	-15.53	Pass
0.46	34.29	9.33	0.04	43.66	Average	Live	46.75	-3.09	Pass
0.29	36.88	9.32	0.04	46.24	Average	Live	50.49	-4.25	Pass
0.15	38.03	9.33	0.05	47.41	Average	Live	55.98	-8.57	Pass
1.20	31.87	9.33	0.05	41.25	Average	Live	46	-4.75	Pass
0.37	35.57	9.33	0.04	44.93	Average	Live	48.4	-3.47	Pass
1.28	29.57	9.34	0.05	38.95	Average	Live	46	-7.05	Pass

## Conducted Emission Test Results

Test specification:		Conducted Emissions		
Environmental Conditions:	Temp(°C):	21	Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
	Mains Power:	120 Vac/ 60Hz		
Tested by:	Gary Chou			
Test Date:	12/04/2018			
Remarks	Neutral			

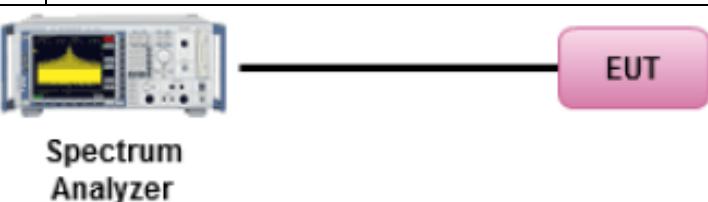


Neutral Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
0.37	34.17	9.33	0.04	43.53	Quasi Peak	Neutral	58.41	-14.88	Pass
1.28	31.46	9.33	0.05	40.85	Quasi Peak	Neutral	56	-15.15	Pass
17.72	29.4	9.43	0.42	39.25	Quasi Peak	Neutral	60	-20.75	Pass
1.57	30.39	9.34	0.06	39.79	Quasi Peak	Neutral	56	-16.21	Pass
1.20	30.6	9.33	0.05	39.99	Quasi Peak	Neutral	56	-16.01	Pass
0.15	37.7	9.33	0.05	47.08	Quasi Peak	Neutral	66	-18.92	Pass
0.37	34.13	9.33	0.04	43.5	Average	Neutral	48.41	-4.91	Pass
1.28	29.46	9.33	0.05	38.84	Average	Neutral	46	-7.16	Pass
17.72	28.45	9.43	0.42	38.3	Average	Neutral	50	-11.7	Pass
1.57	27.65	9.34	0.06	37.05	Average	Neutral	46	-8.95	Pass
1.20	29.54	9.33	0.05	38.92	Average	Neutral	46	-7.08	Pass
0.15	26.86	9.33	0.05	36.24	Average	Neutral	56	-19.76	Pass

## 10.2 26 dB , 6 dB, & 99% Bandwidth

### Requirement(s):

Spec	Item	Requirement	Applicable
RSS Gen Issue 4	-	99% BW: Report only for reference.	<input checked="" type="checkbox"/>
	-	99% BW: Report only for power limit calculation.	<input checked="" type="checkbox"/>
§ 15.407	-	26 dB Emission BW: Report only for reference.	<input checked="" type="checkbox"/>
	a) (2)	26 dB Emission BW: Report only for power limit calculation.	<input type="checkbox"/>
RSS 247 Issue 2	e)	Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.	<input checked="" type="checkbox"/>
Test Setup		 <p><b>Spectrum Analyzer</b></p>	
Test Procedure		<p>789033 D02 General U-NII Test Procedures New Rules v02r01</p> <p><u>26dB Emission bandwidth measurement procedure (Other than 5.725-5.85 GHz)</u></p> <ul style="list-style-type: none"> <li>- Allow the trace to stabilize.</li> <li>- Use the spectrum analyzer built-in measurement function to determine the 26dB BW. <ul style="list-style-type: none"> <li>o Set RBW = around 1% of emission bandwidth</li> <li>o Set VBW &gt; RBW</li> <li>o Detector = Peak</li> <li>o Trace mode = max hold</li> </ul> </li> <li>- Capture the plot.</li> <li>- Repeat above steps for different test channel and other modulation type.</li> </ul> <p><u>6 dB Minimum emission bandwidth measurement procedure (for 5.725-5.85 GHz)</u></p> <ul style="list-style-type: none"> <li>- Allow the trace to stabilize.</li> <li>- Use the spectrum analyzer built-in measurement function to determine the 6dB BW. <ul style="list-style-type: none"> <li>o Set RBW = 100 KHz</li> <li>o Set VBW <math>\geq</math> 3 x RBW</li> <li>o Detector = Peak</li> <li>o Trace mode = max hold</li> <li>o Sweep = auto couple</li> </ul> </li> <li>- Capture the plot.</li> <li>- Repeat above steps for different test channel and other modulation type.</li> </ul>	
Test Date	12/04/2018 – 12/12/2018	Environmental condition	Temperature 22°C Relative Humidity 38% Atmospheric Pressure 1020mbar
Remark			
Result	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	

**Test Data**  Yes  N/A  
**Test Plot**  Yes  N/A

Test was done by Gary Chou at RF test site.

**26dB Bandwidth measurement result for 5.2GHz**

Type	Test mode	Freq (MHz)	CH	Result (MHz)
26dB BW	802.11a	5180	Low	26.923
	802.11a	5200	Mid	27.614
	802.11a	5240	High	28.790
	802.11n-20	5180	Low	28.469
	802.11n-20	5200	Mid	27.297
	802.11n-20	5240	High	27.389
	802.11n-40	5190	Low	41.137
	802.11n-40	5230	High	39.672

**6dB Bandwidth measurement result for 5.8GHz**

Type	Test mode	Freq (MHz)	CH	Result (MHz)
6dB BW	802.11a	5745	Low	16.534
	802.11a	5785	Mid	16.504
	802.11a	5825	High	16.546
	802.11n-20	5745	Low	17.803
	802.11n-20	5785	Mid	17.803
	802.11n-20	5825	High	17.797
	802.11n-40	5755	Low	36.532
	802.11n-40	5795	High	36.505

### 99% Bandwidth Measurement Result

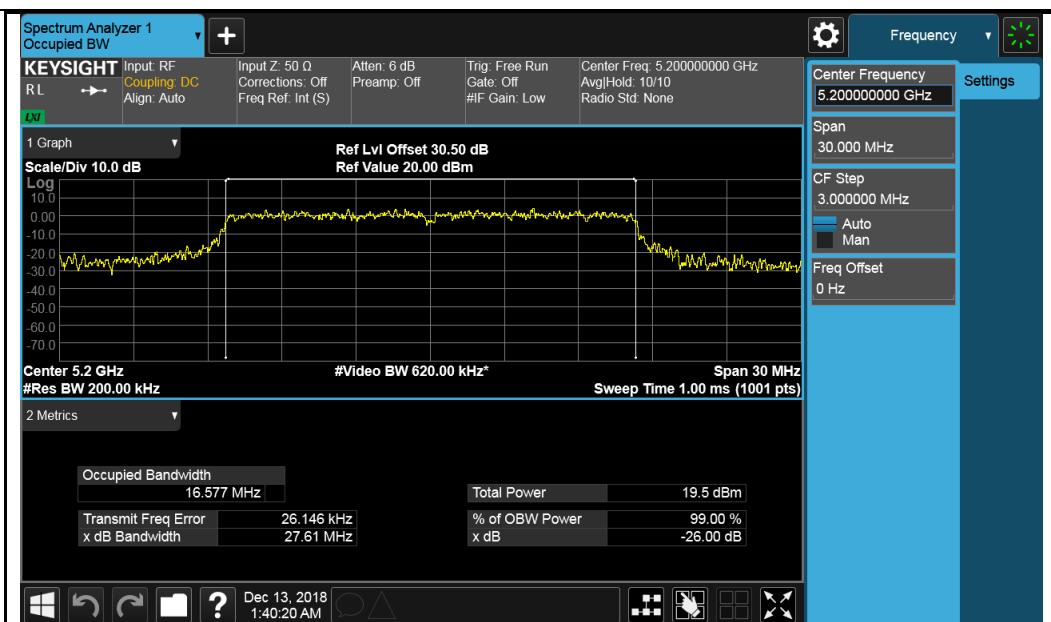
Band	Test mode	Frequency (MHz)	CH	Result (MHz)	Limit (MHz)
5150-5250	802.11a	5180	Low	16.538	-
		5200	Mid	16.577	-
		5240	High	16.608	-
	802.11n-20	5180	Low	17.780	-
		5200	Mid	17.763	-
		5240	High	17.783	-
	802.11n-40	5190	Low	36.306	-
		5230	High	36.273	-

Band	Test mode	Frequency (MHz)	CH	Result (MHz)	Limit (MHz)
5745-5825	802.11a	5745	Low	16.450	-
		5785	Mid	16.440	-
		5825	High	16.481	-
	802.11n-20	5745	Low	17.685	-
		5785	Mid	17.697	-
		5825	High	17.703	-
	802.11n-40	5755	Low	36.271	-
		5795	High	36.266	-

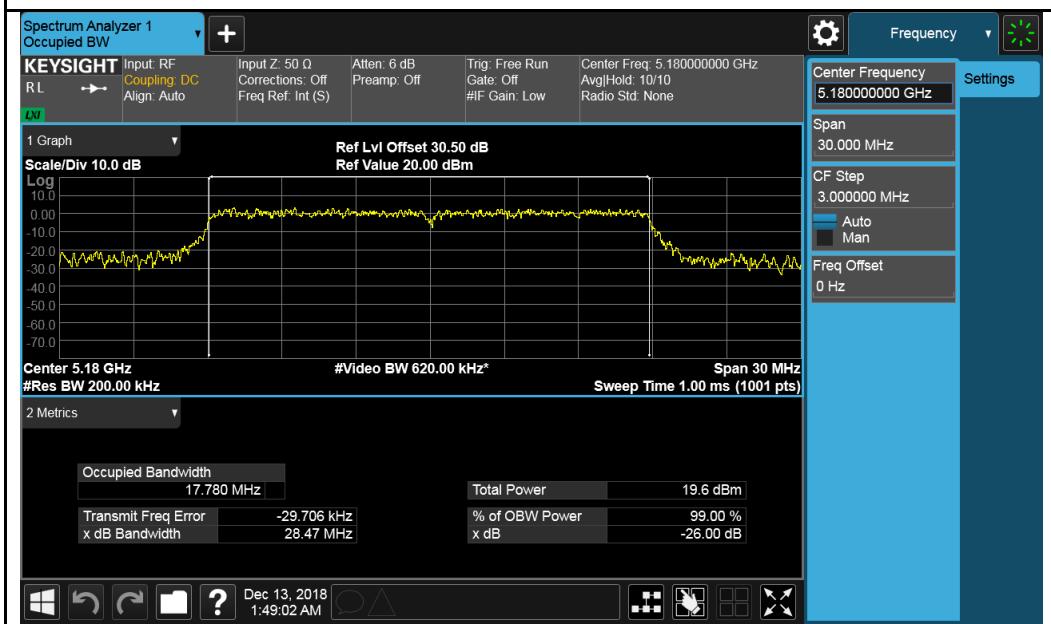
## 26dB & 99% Bandwidth Test Plots

W52:

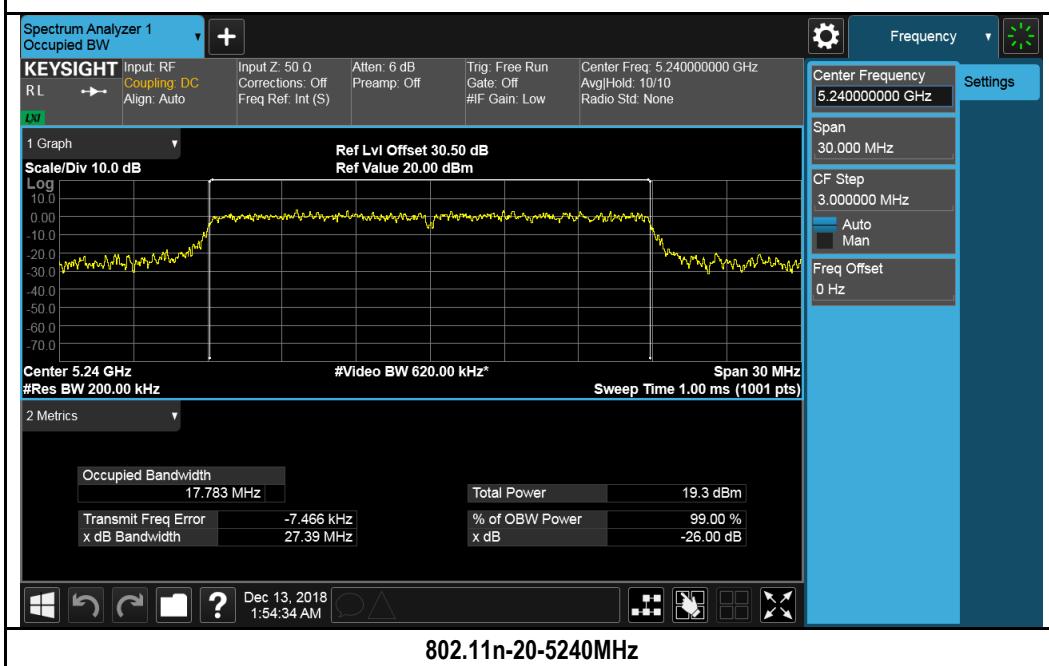
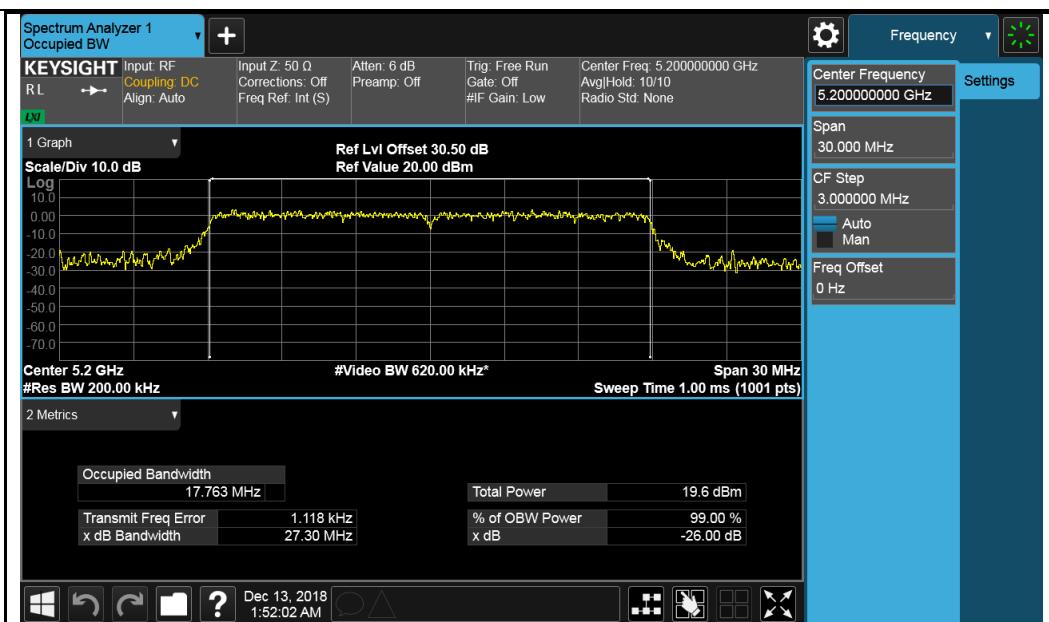


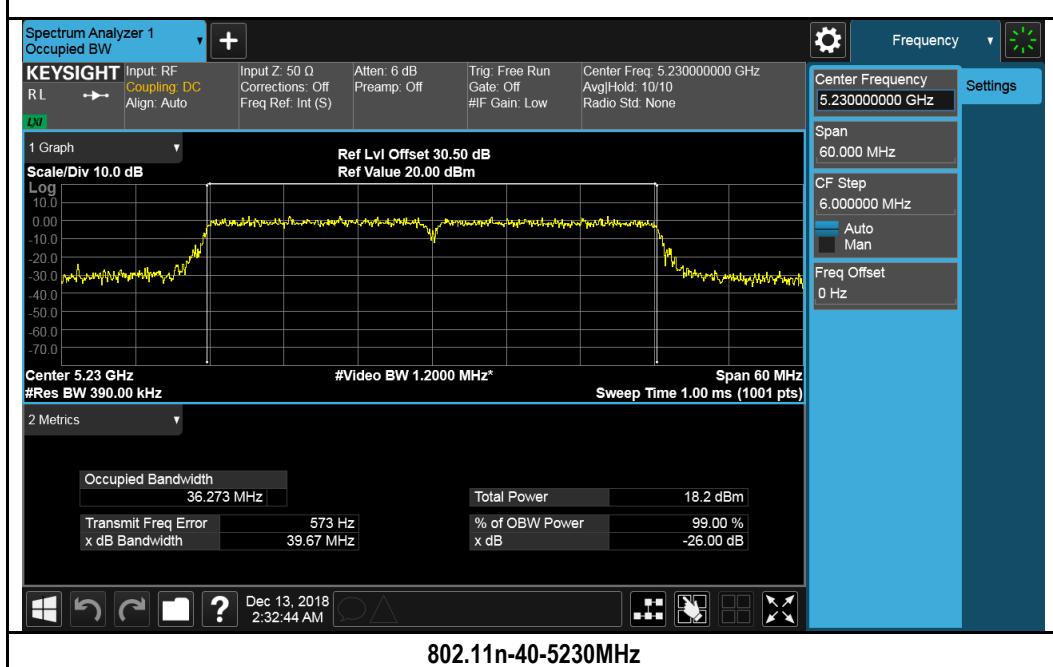
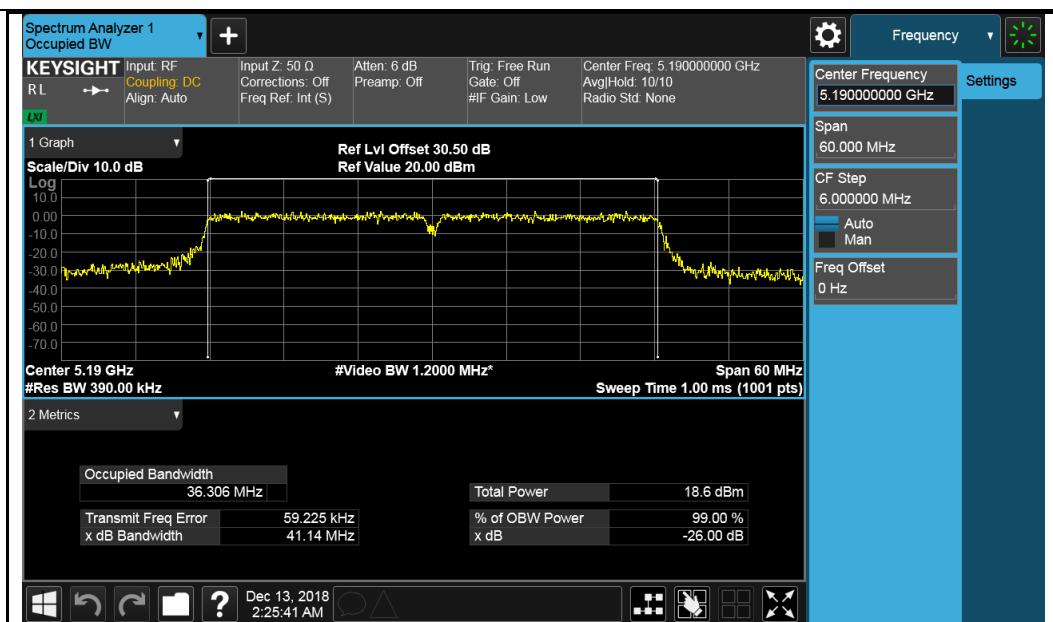


### 802.11a-5240MHz



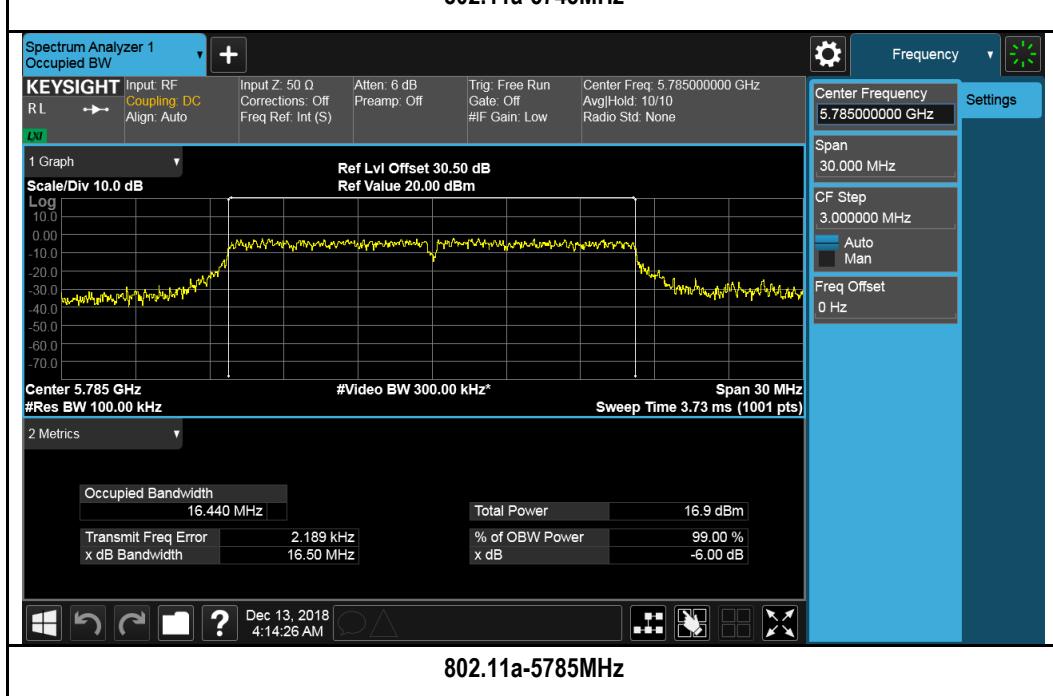
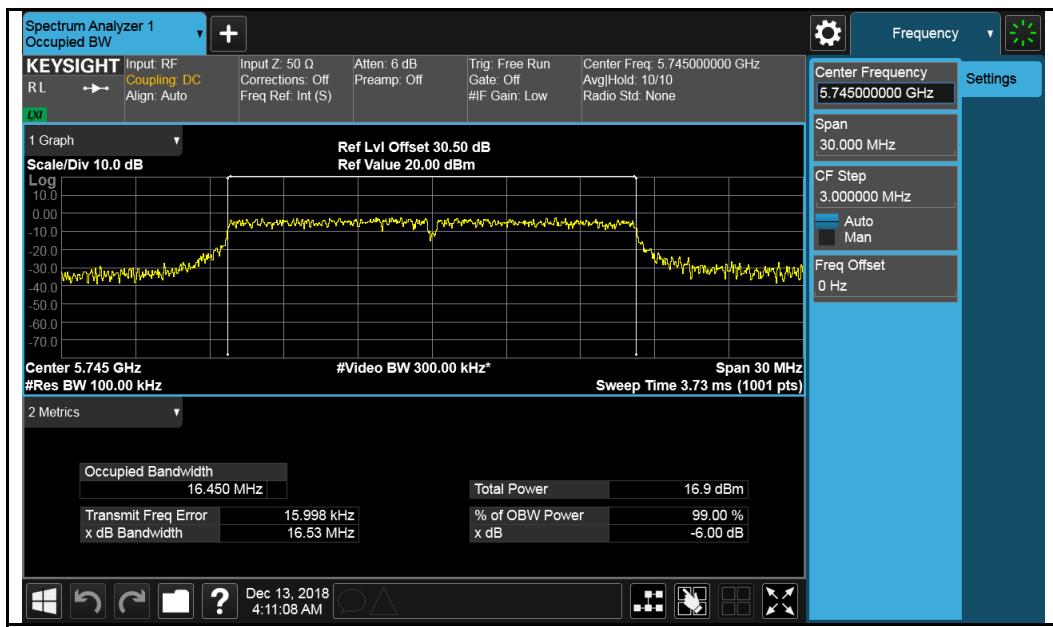
### 802.11n-20-5180MHz

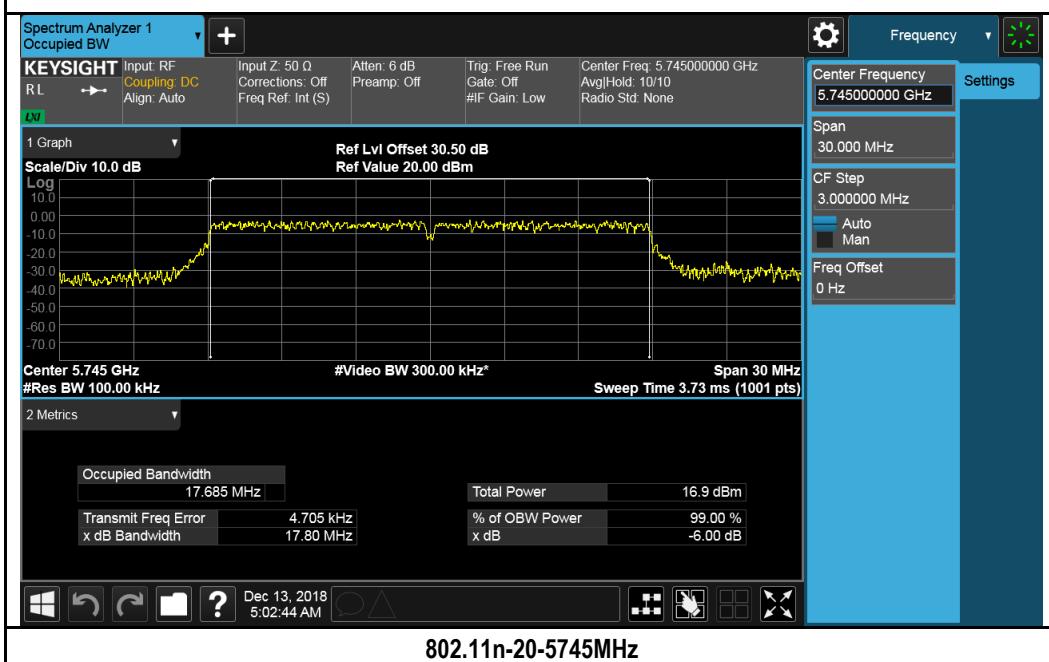
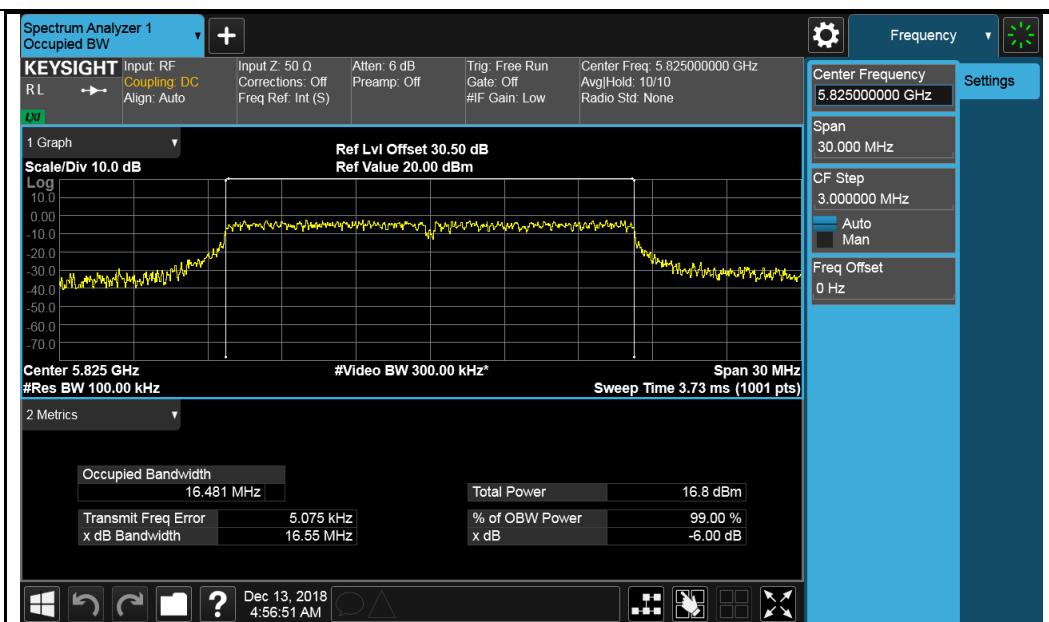


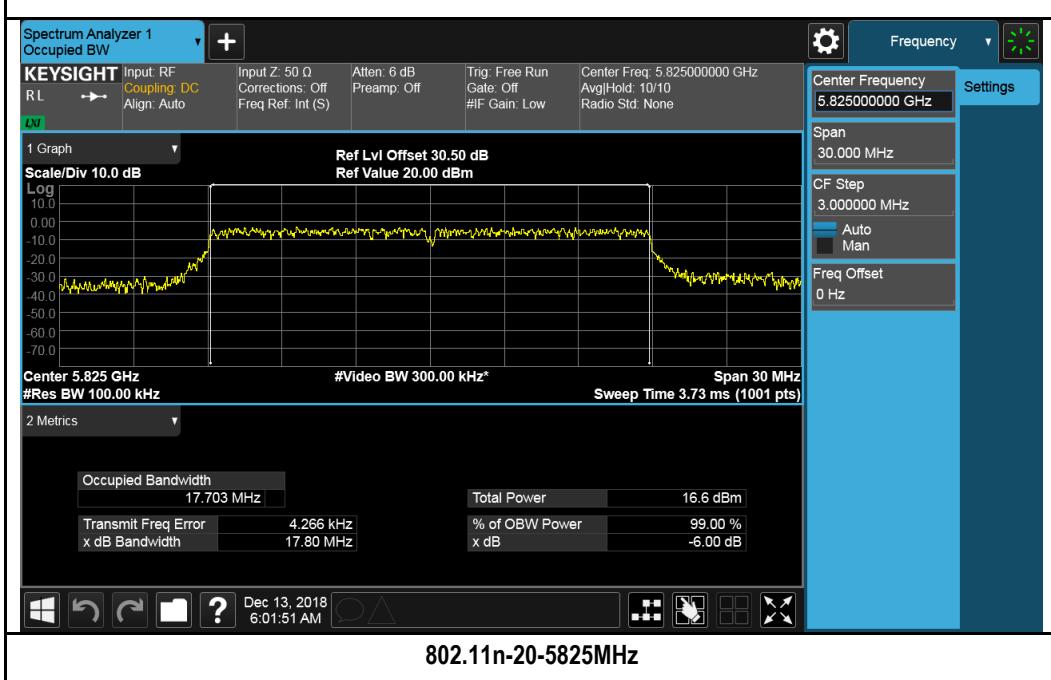
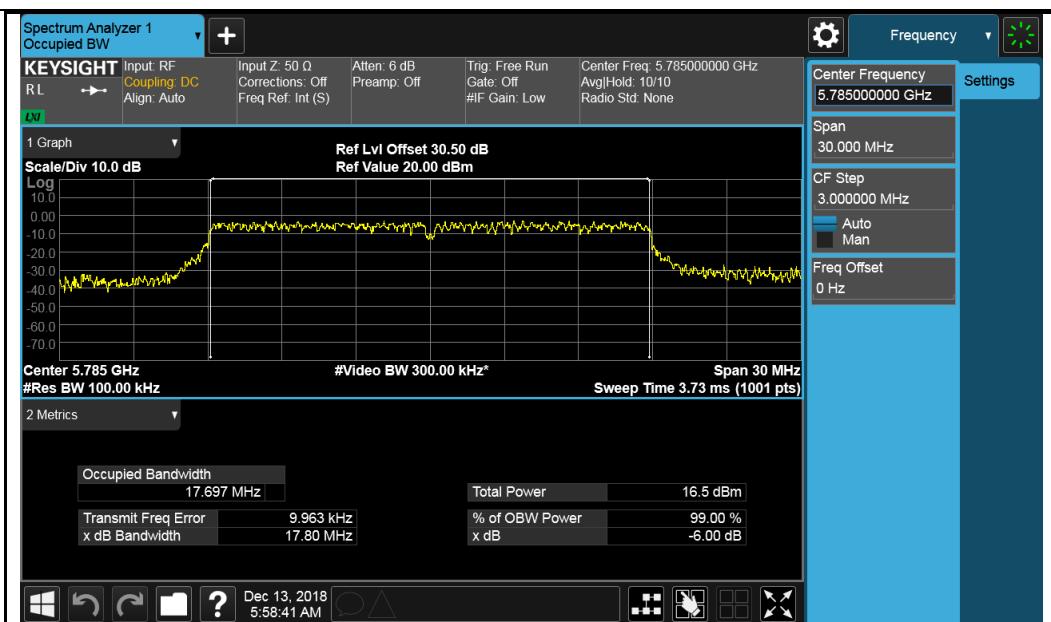


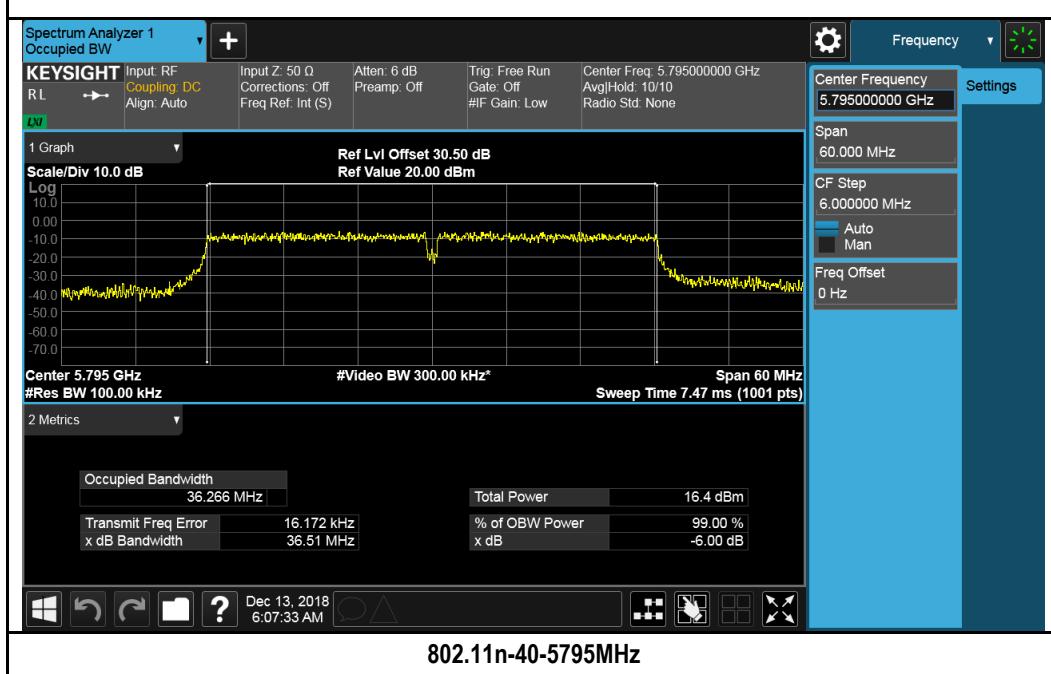
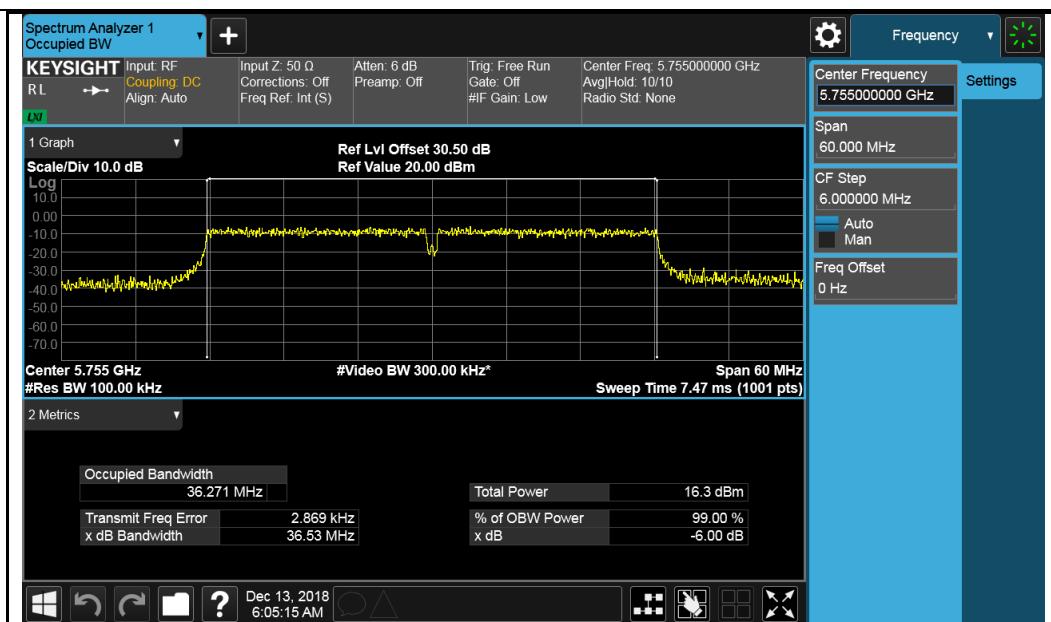
## 99% & 6dB Bandwidth Test Plots

W58:



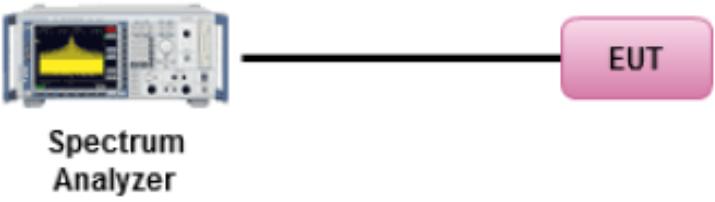






### 10.3 Output Power

**Requirement(s):**

Spec	Item	Requirement	Applicable
RSS 247, A6.2	(1)	For band 5150-5250MHz, the maximum e.i.r.p. shall not exceed 200 mW or $10 + 10 \log_{10} B$ , dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.	<input checked="" type="checkbox"/>
§ 15.407 RSS 247, A6.2	a)(1)(vi)	For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	<input checked="" type="checkbox"/>
	a)(3)	For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.	<input checked="" type="checkbox"/>
Test Setup	 <b>Spectrum Analyzer</b>		
Test Procedure	<p>789033 D02 General U-NII Test Procedures New Rules v02r01</p> <p><u>Measurement using a Spectrum Analyzer or EMI Receiver (SA)</u></p> <p>Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep):</p> <ul style="list-style-type: none"> <li>(i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.</li> <li>(ii) Set RBW = 1 MHz</li> <li>(iii) Set VBW = 3 MHz</li> <li>(iv) Number of points in sweep <math>\geq 2 \times \text{span} / \text{RBW}</math>. (This ensures that bin-to-bin spacing is <math>\leq \text{RBW}/2</math>, so that narrowband signals are not lost between frequency bins.)</li> <li>(v) Sweep time = auto.</li> <li>(vi) Detector = power averaging (rms), if available. Otherwise, use sample detector mode.</li> <li>(vii) If transmit duty cycle <math>&lt; 98\%</math>, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle <math>\geq 98\%</math>, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run."</li> <li>(viii) Trace average at least 100 traces in power averaging (rms) mode.</li> <li>(ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.</li> </ul>		
Test Date	12/04/2018 – 12/12/2018	Environmental condition	Temperature 21°C Relative Humidity 40% Atmospheric Pressure 1019mbar
Remark	N/A		
Result	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	

**Test Data**  Yes  N/A

**Test Plot**  Yes (See below)  N/A

**Test was done by Gary Chou at RF test site.**

### Output Power measurement result 5.2GHz

Test mode	Freq (MHz)	CH	Conducted Power (dBm)	Limit (dBm)	Result
802.11a	5180	Low	16.214	24	Pass
	5200	Mid	15.901	24	Pass
	5240	High	15.767	24	Pass
802.11n20	5180	Low	16.054	24	Pass
	5200	Mid	15.993	24	Pass
	5240	High	15.799	24	Pass
802.11n40	5190	Low	15.315	24	Pass
	5230	Mid	14.892	24	Pass

### EIRP result 5.2GHz:

Test mode	Freq (MHz)	CH	Conducted Power(dBm)	Antenna Gain(dBi)	E.I.R.P (dBm)	Limit	Result
802.11a	5180	Low	16.214	3.5	19.714	23	Pass
	5200	Mid	15.901	3.5	19.401	23	Pass
	5240	High	15.767	3.5	19.267	23	Pass
802.11n20	5180	Low	16.054	3.5	19.554	23	Pass
	5200	Mid	15.993	3.5	19.493	23	Pass
	5240	High	15.799	3.5	19.299	23	Pass
802.11n40	5190	Low	15.315	3.5	18.815	23	Pass
	5230	Mid	14.892	3.5	18.392	23	Pass

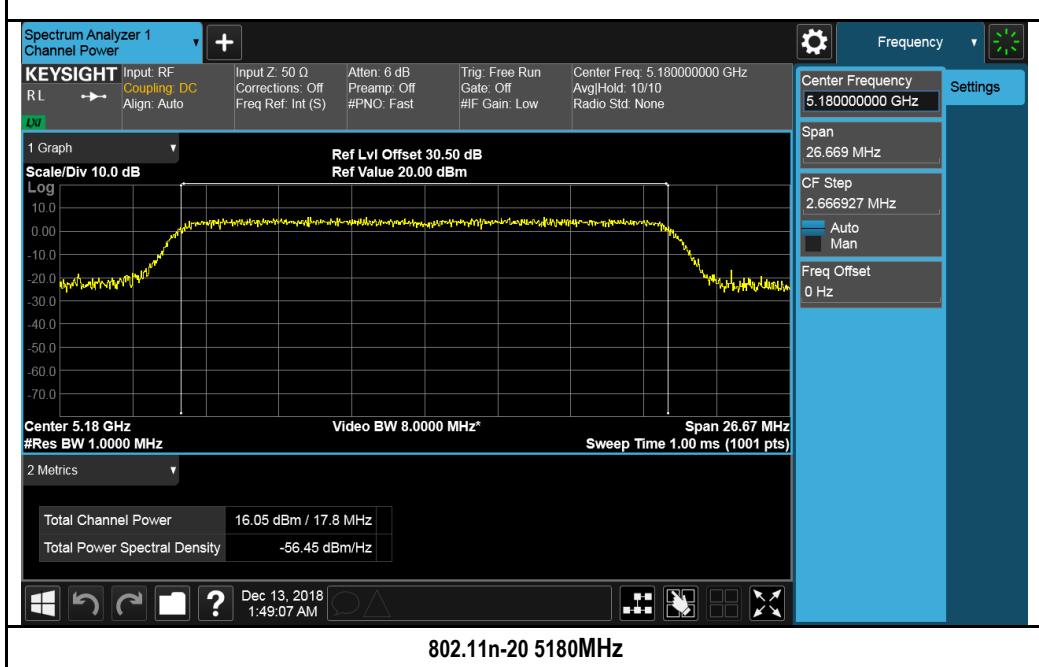
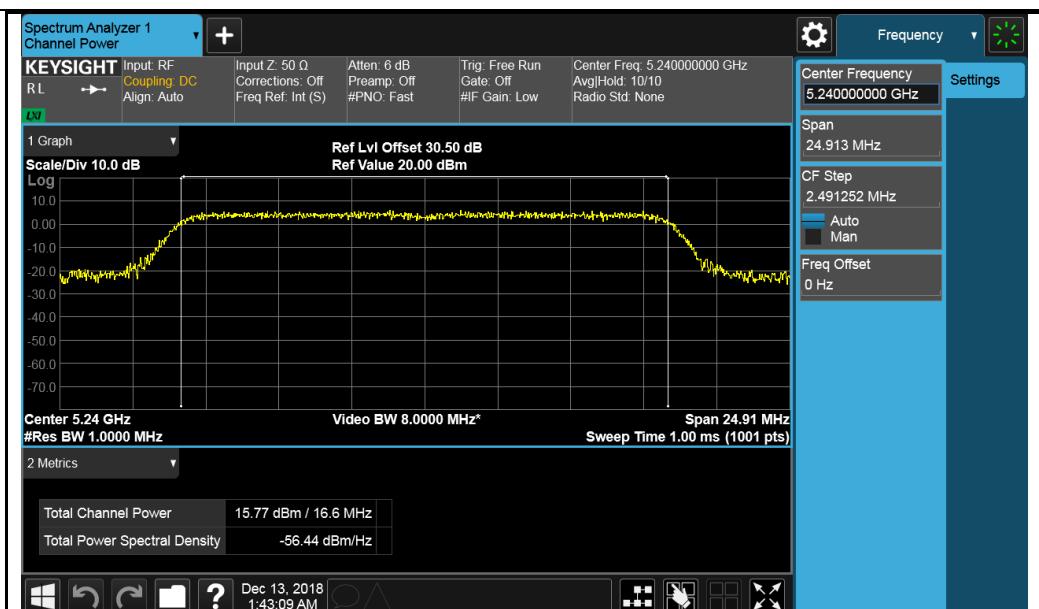
### Output Power measurement result mode 5.8GHz

Test mode	Freq (MHz)	CH	Conducted Power (dBm)	Limit (dBm)	Result
802.11A	5745	Low	13.523	30	Pass
	5785	Mid	13.353	30	Pass
	5825	High	12.801	30	Pass
802.11n20	5745	Low	13.498	30	Pass
	5785	Mid	13.273	30	Pass
	5825	High	13.157	30	Pass
802.11n40	5755	Low	14.272	30	Pass
	5795	Mid	14.018	30	Pass

## Test Plot for W52:

### Chain 0:

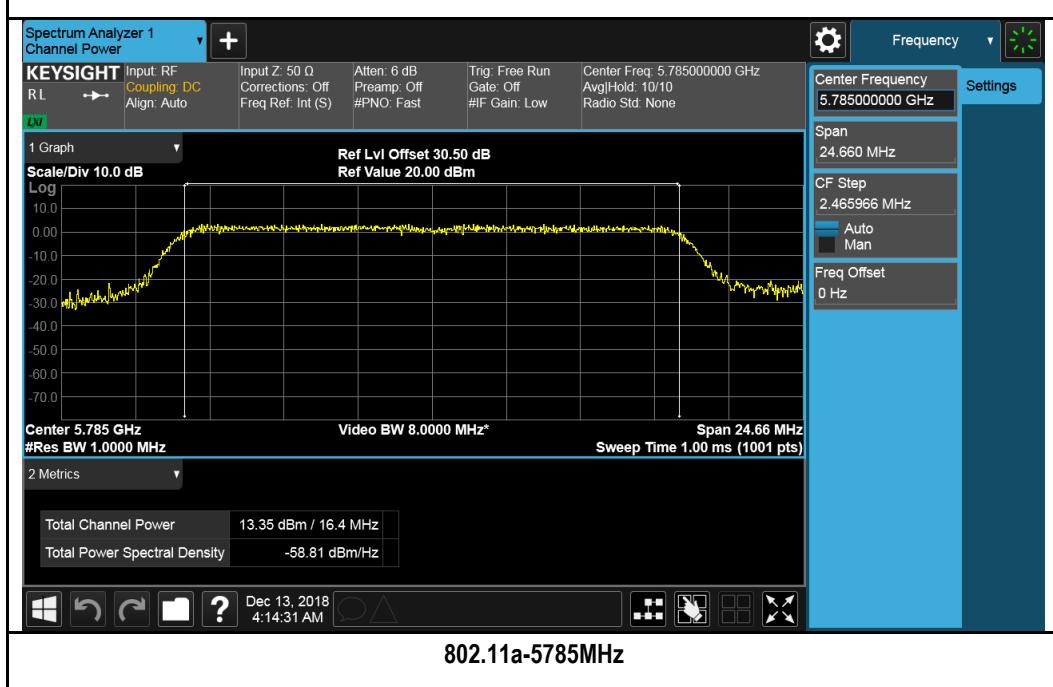


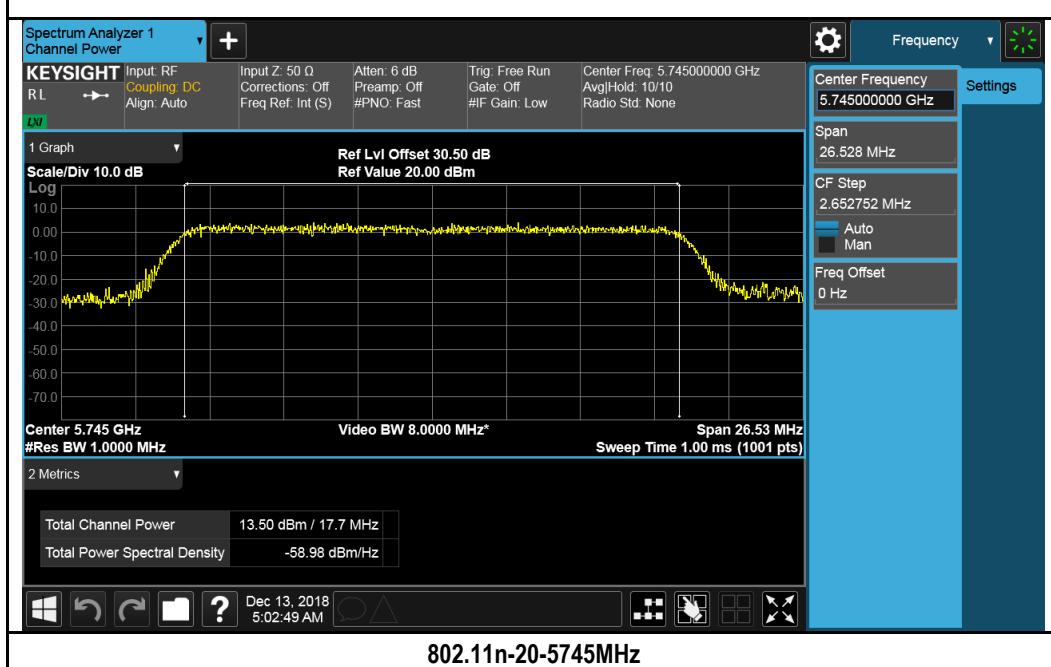
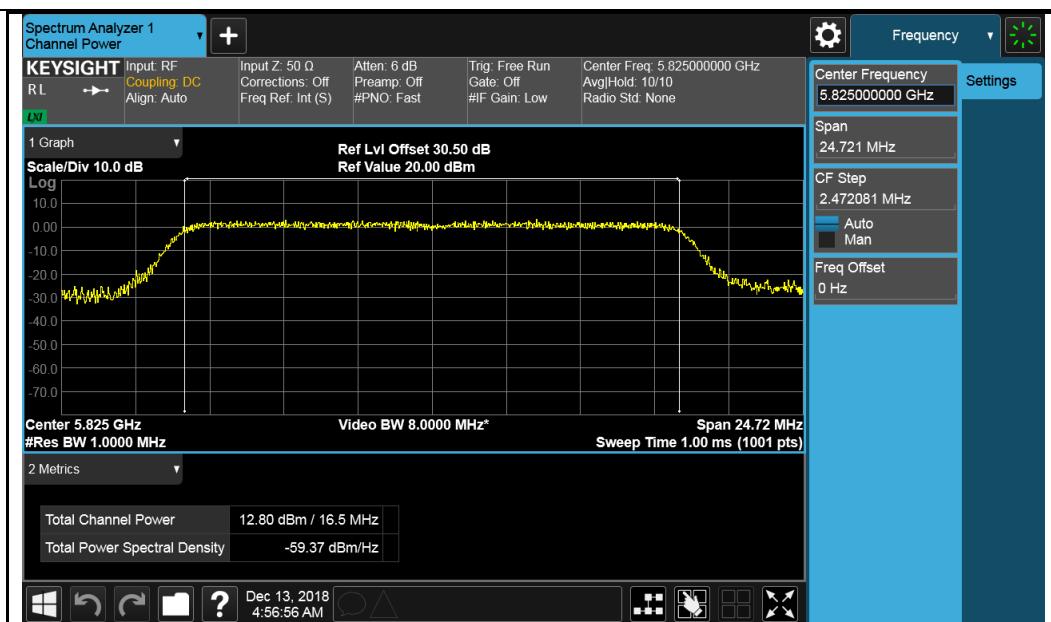


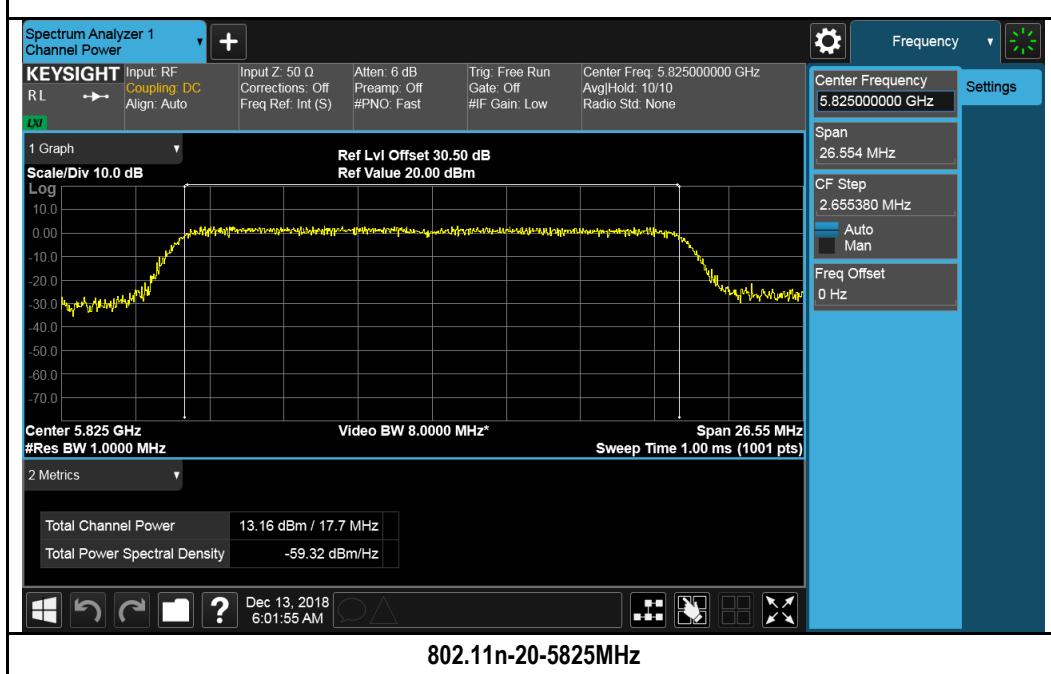
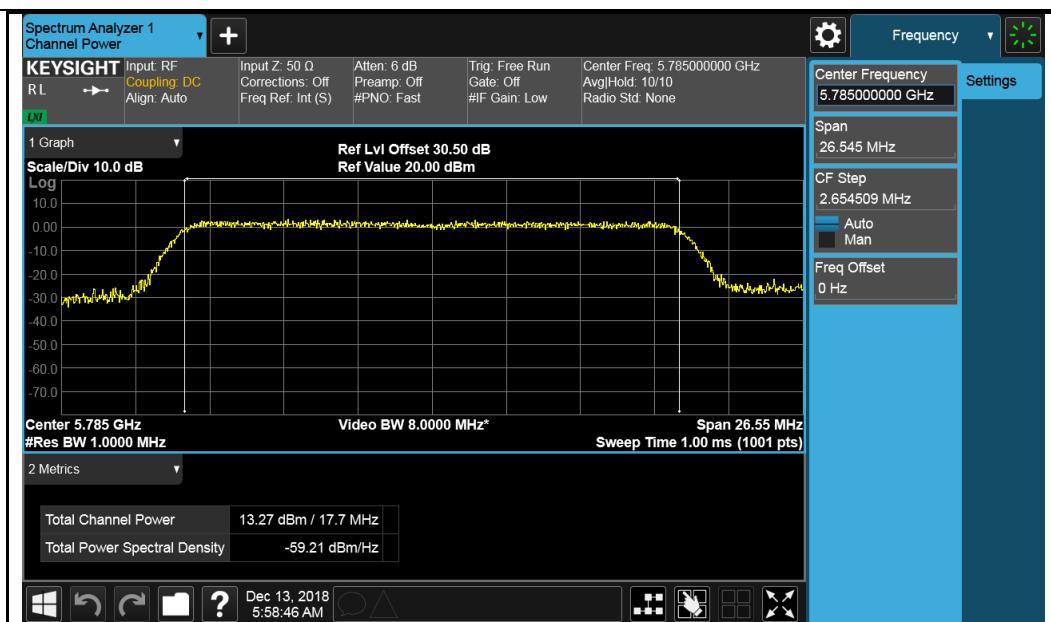


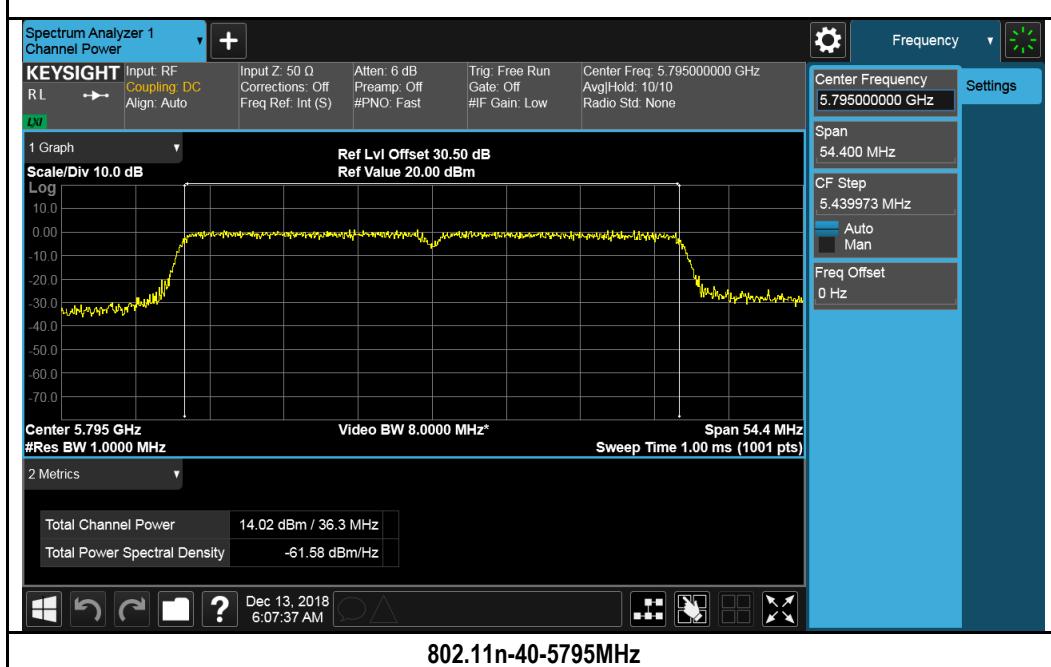
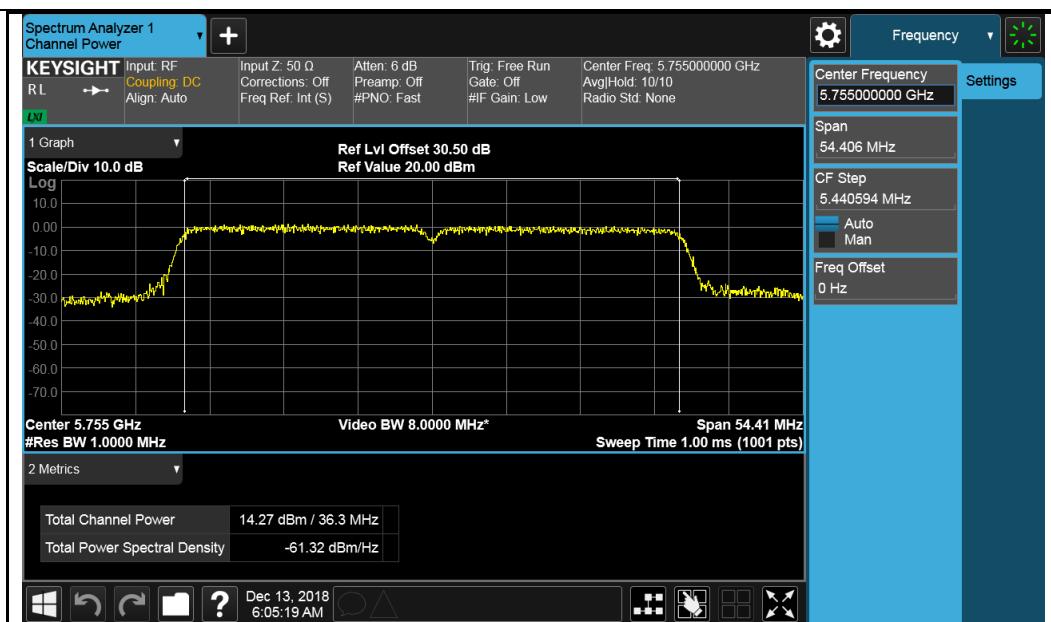


Test Plot for W58:



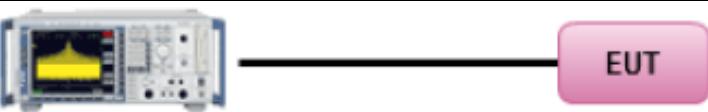






## 10.4 Peak Spectral Density

Requirement(s):

Spec	Item	Requirement	Applicable
RSS 247 (A6.2)	a)	For transmitters operating in the 5.15-5.25 GHz band. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.	<input checked="" type="checkbox"/>
§ 15.407 RSS 247 (A6.2)	a)(1)(i)	For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band.	<input checked="" type="checkbox"/>
	a)(3)	For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.	<input checked="" type="checkbox"/>
Test Setup	 <p><b>Spectrum Analyzer</b></p>		
Test Procedure	<p>789033 D02 General U-NII Test Procedures New Rules v02r01, II.F. Method SA-1</p> <p><u>Maximum spectral density measurement procedure</u></p> <ul style="list-style-type: none"> <li>- Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.</li> <li>- Set RBW = 1 MHz</li> <li>- Set VBW <math>\geq</math> 3 MHz</li> <li>- Detector = RMS.</li> <li>- Sweep time = auto couple.</li> <li>- Trace mode = max hold.</li> <li>- Trace average at least 100 traces in power averaging</li> <li>- Use the peak marker function to determine the maximum amplitude level within the RBW.</li> </ul> <p>Apply correction to the result if different RBW is used.</p>		
Test Date	12/04/2018 – 12/12/2018	Environmental condition	Temperature 22°C Relative Humidity 42% Atmospheric Pressure 1020mbar
Remark	N/A		
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

**Test Data**  Yes  N/A

**Test Plot**  Yes (See below)  N/A

**Test was done by Gary Chou at RF test site.**

### PSD measurement result for 5.2GHz

Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)	Limit (dBm)	Result
802.11a	5180	Low	4.500	17	Pass
	5200	Mid	4.135	17	Pass
	5240	High	3.964	17	Pass
802.11n20	5180	Low	3.965	17	Pass
	5200	Mid	4.016	17	Pass
	5240	High	4.066	17	Pass
802.11n40	5190	Low	0.013	17	Pass
	5230	Mid	-0.232	17	Pass

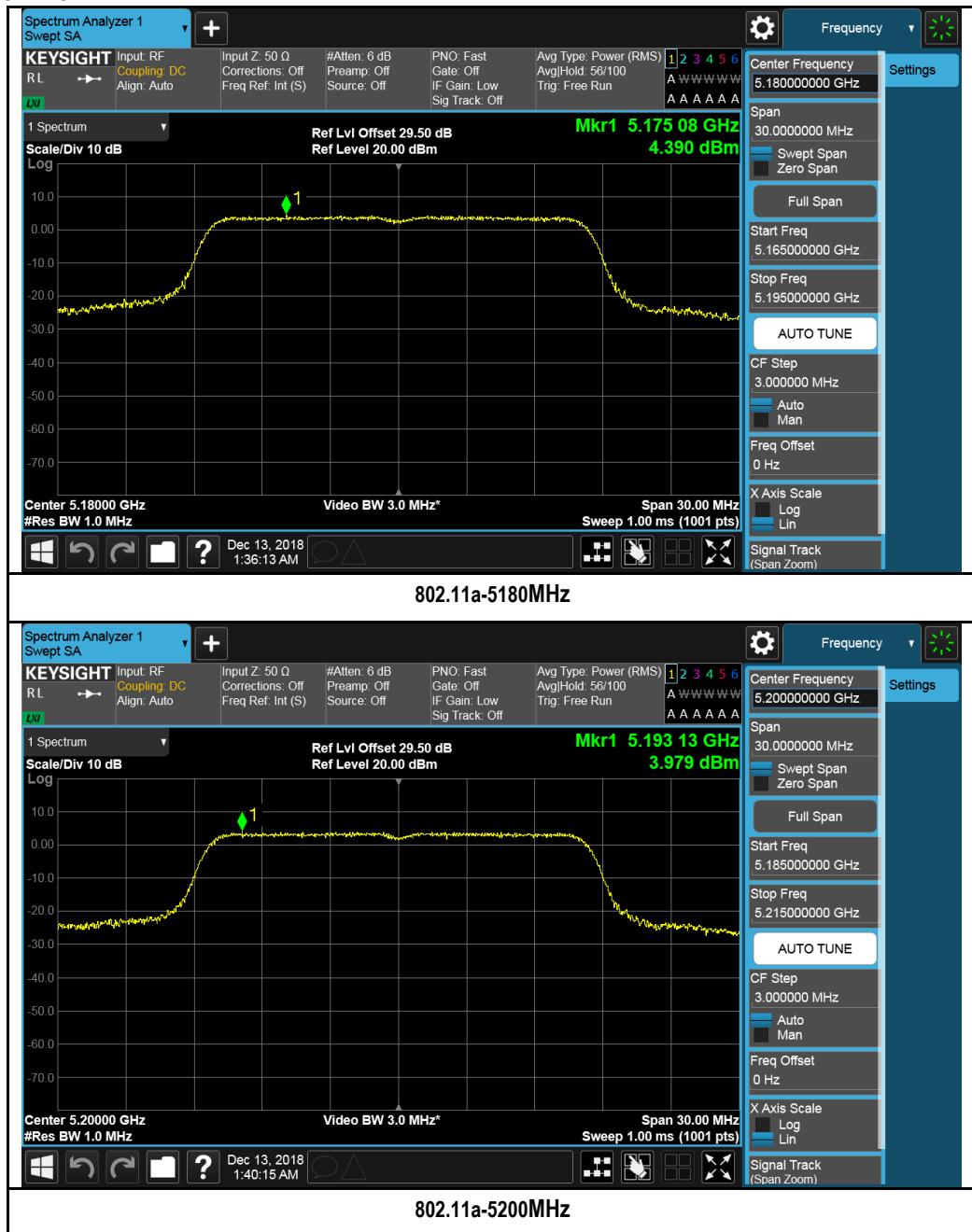
### EIRP result 5.2GHz:

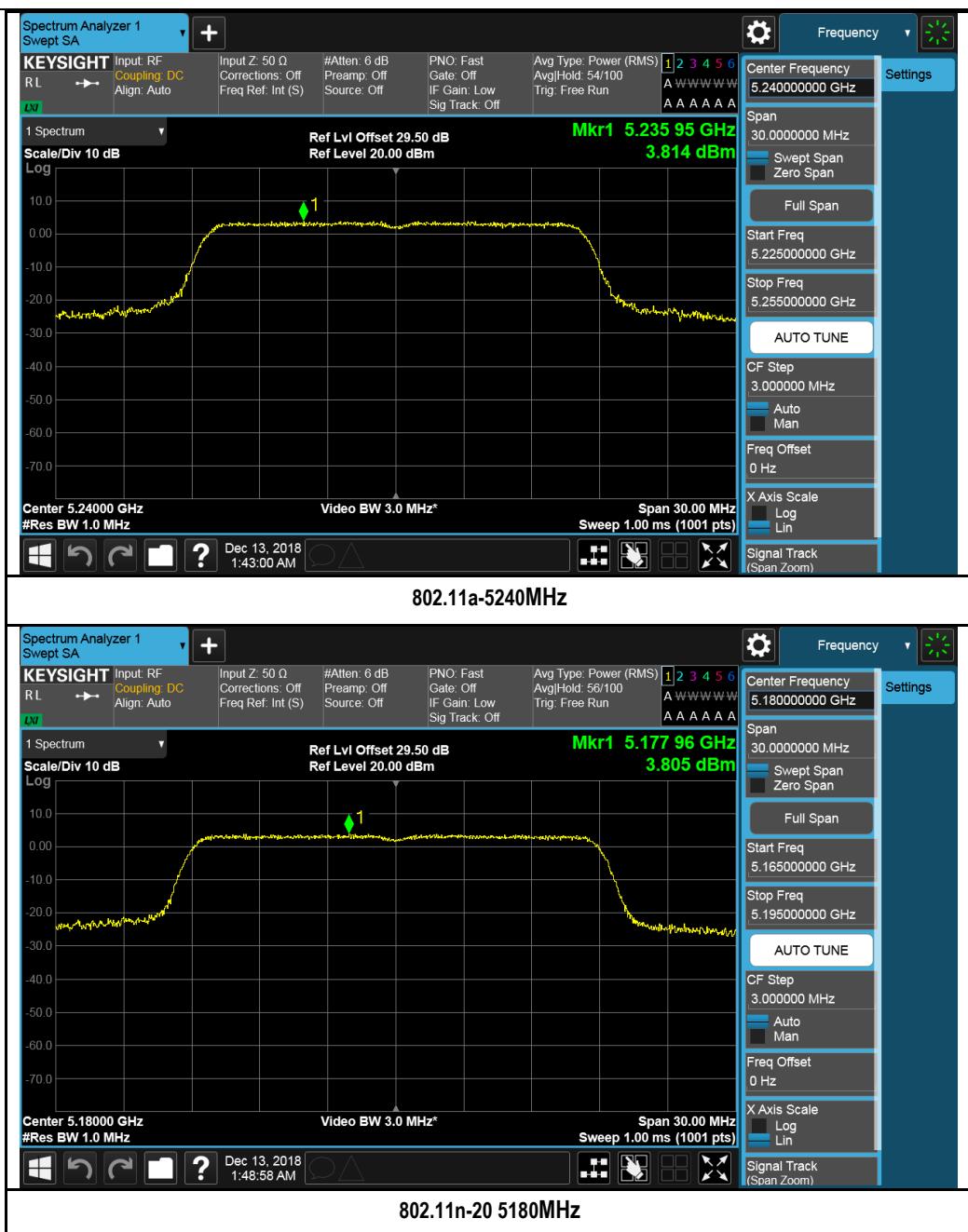
Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)	Antenna Gain(dBi)	E.I.R.P (dBm)	Limit	Result
802.11A	5180	Low	4.500	3.5	8	10	Pass
	5200	Mid	4.135	3.5	7.635	10	Pass
	5240	High	3.964	3.5	7.464	10	Pass
802.11n20	5180	Low	3.965	3.5	7.465	10	Pass
	5200	Mid	4.016	3.5	7.516	10	Pass
	5240	High	4.066	3.5	7.566	10	Pass
802.11n40	5190	Low	0.013	3.5	3.513	10	Pass
	5230	Mid	-0.232	3.5	3.268	10	Pass

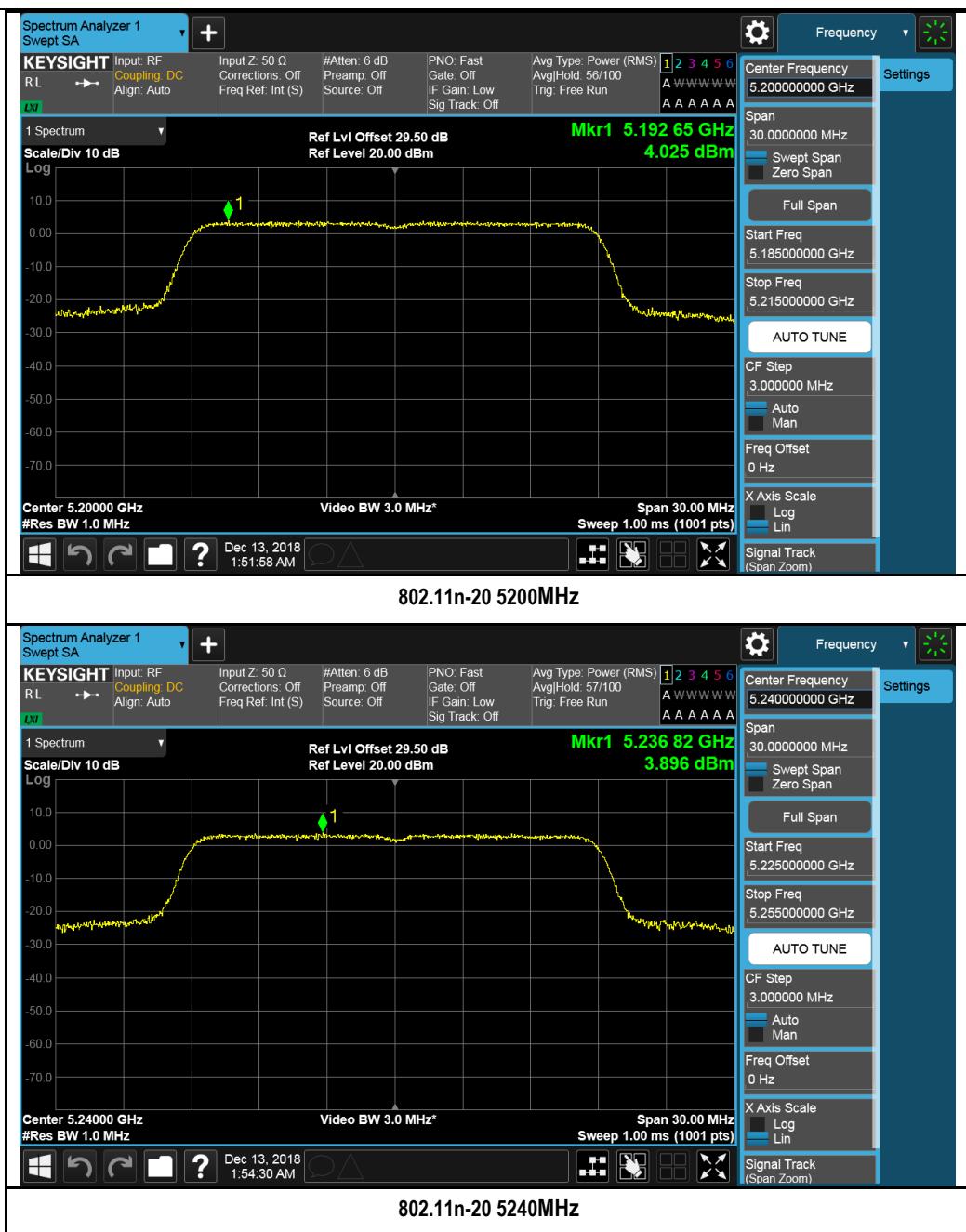
### PSD measurement result for 5.8GHz

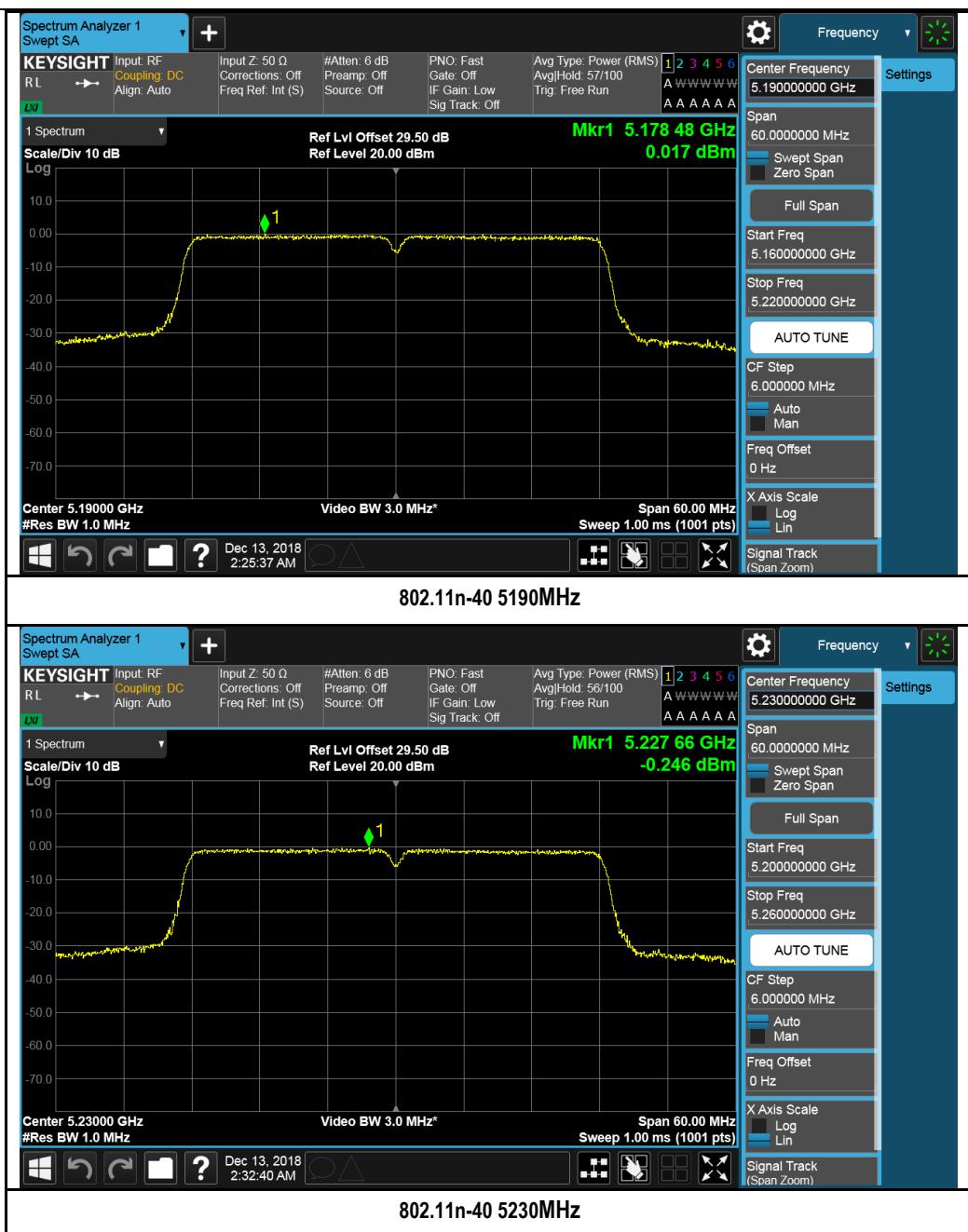
Test mode	Freq (MHz)	CH	Conducted Power (dBm)	Limit (dBm)	Result
802.11A	5745	Low	-5.972	30	Pass
	5785	Mid	-6.561	30	Pass
	5825	High	-6.480	30	Pass
802.11 n20	5745	Low	-6.386	30	Pass
	5785	Mid	-6.644	30	Pass
	5825	High	-6.812	30	Pass
802.11 n40	5755	Low	-9.525	30	Pass
	5795	Mid	-9.279	30	Pass
Note	BW correction factor = $10\log(500\text{kHz}/\text{RBW})$ , RBW was set to 100kHz during test.				

### Test Plot for W52:

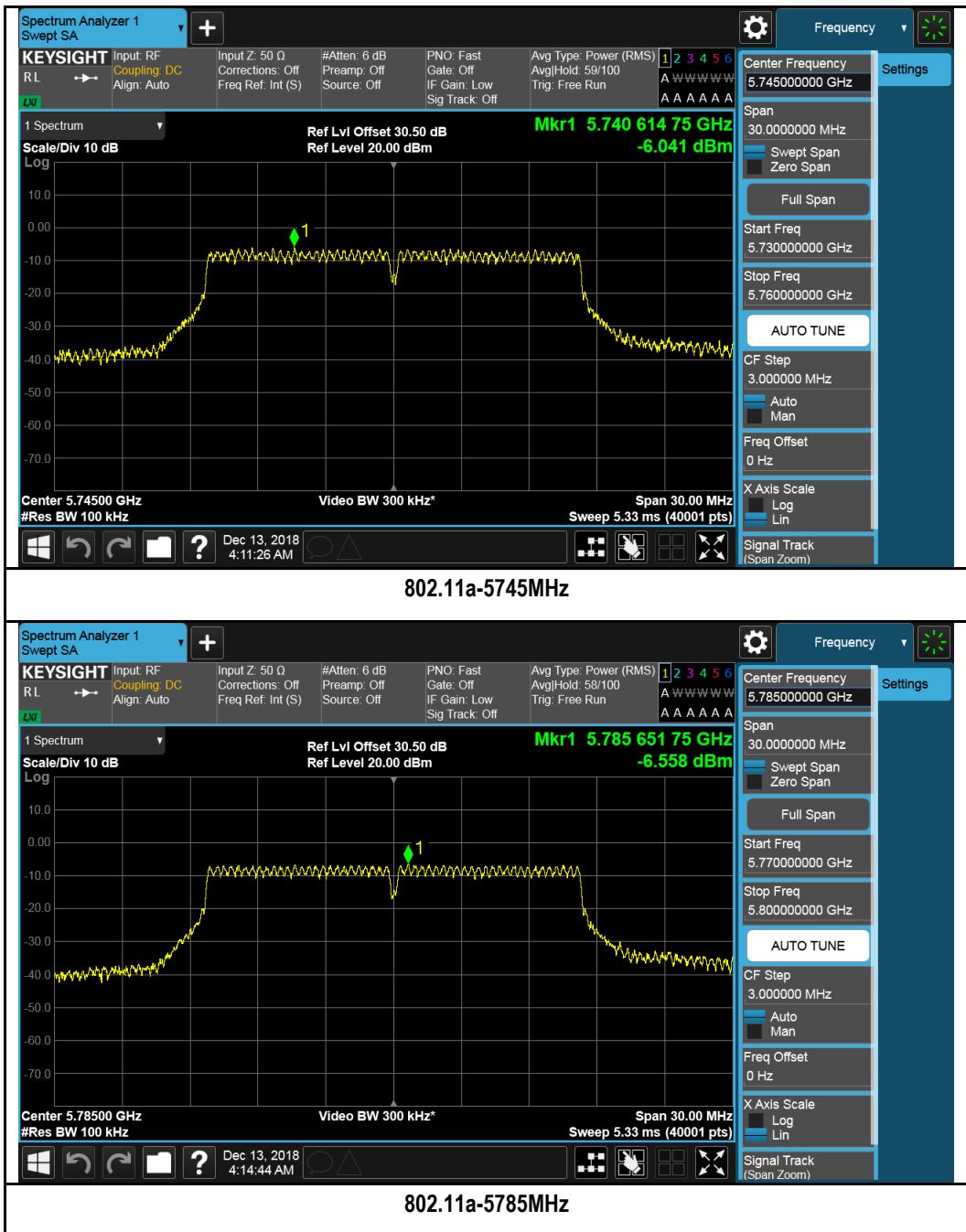


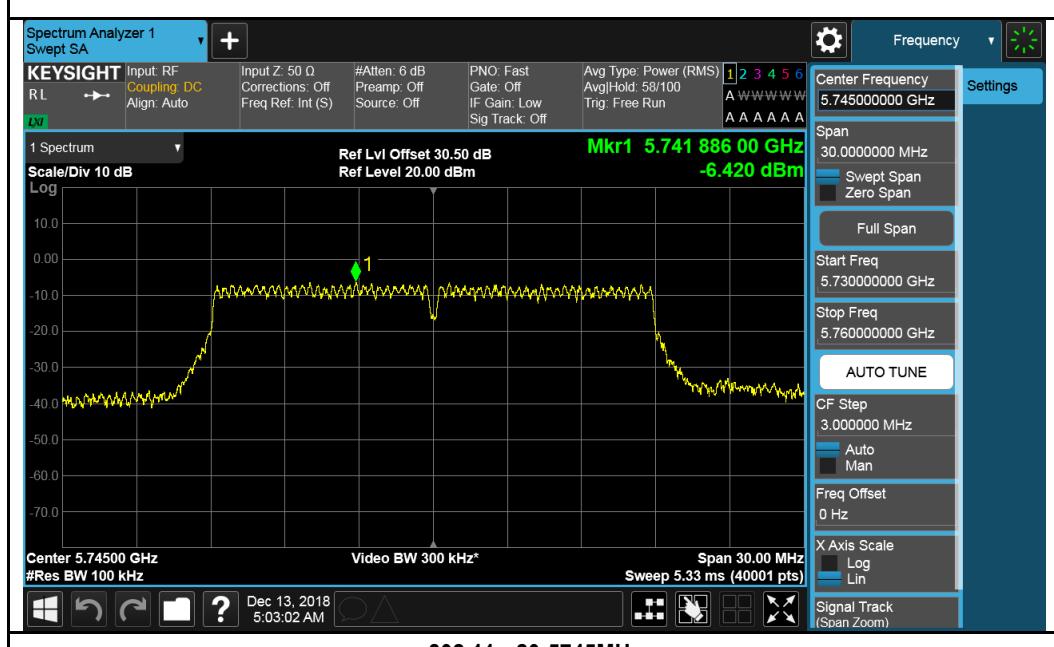
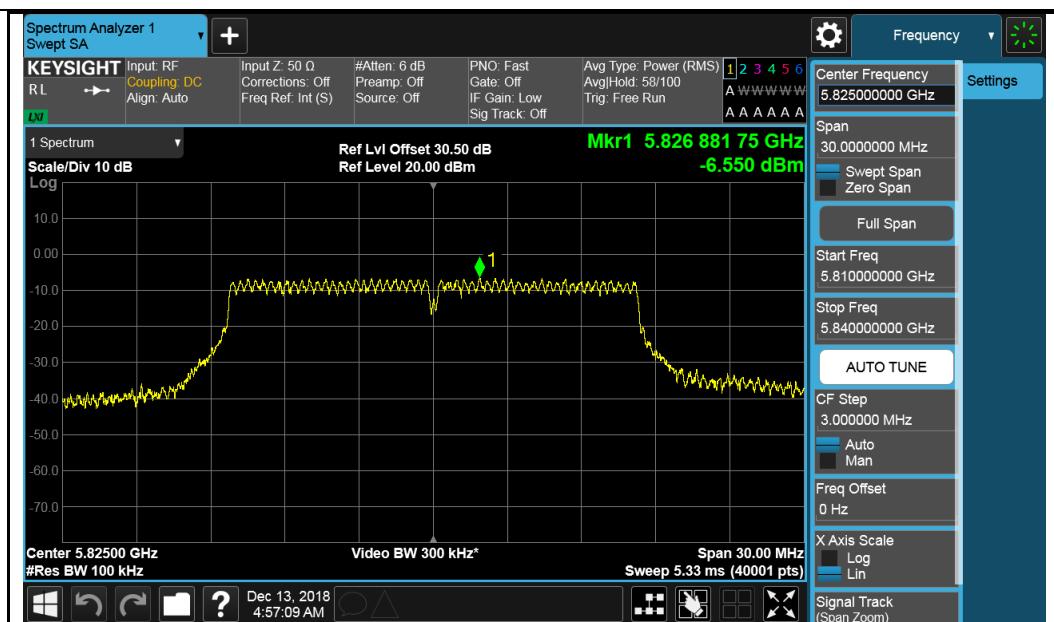


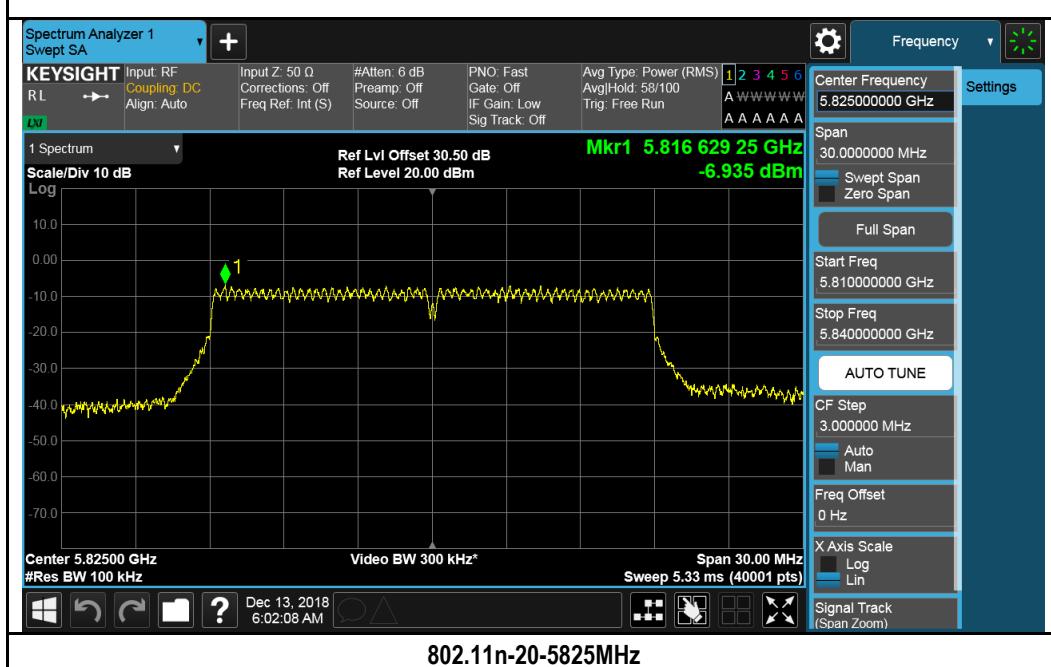
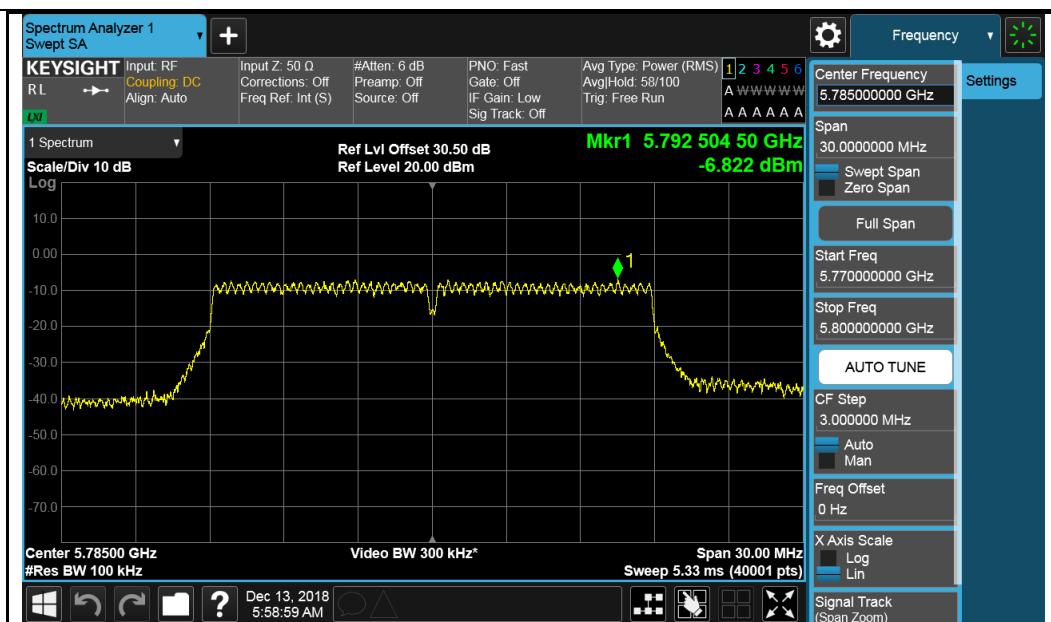


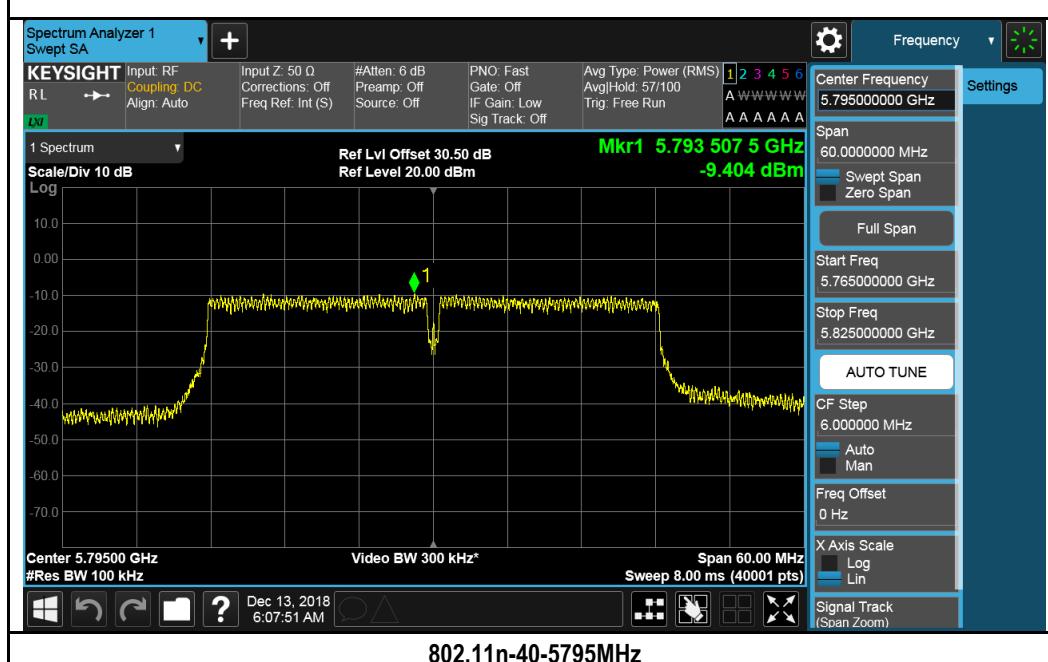
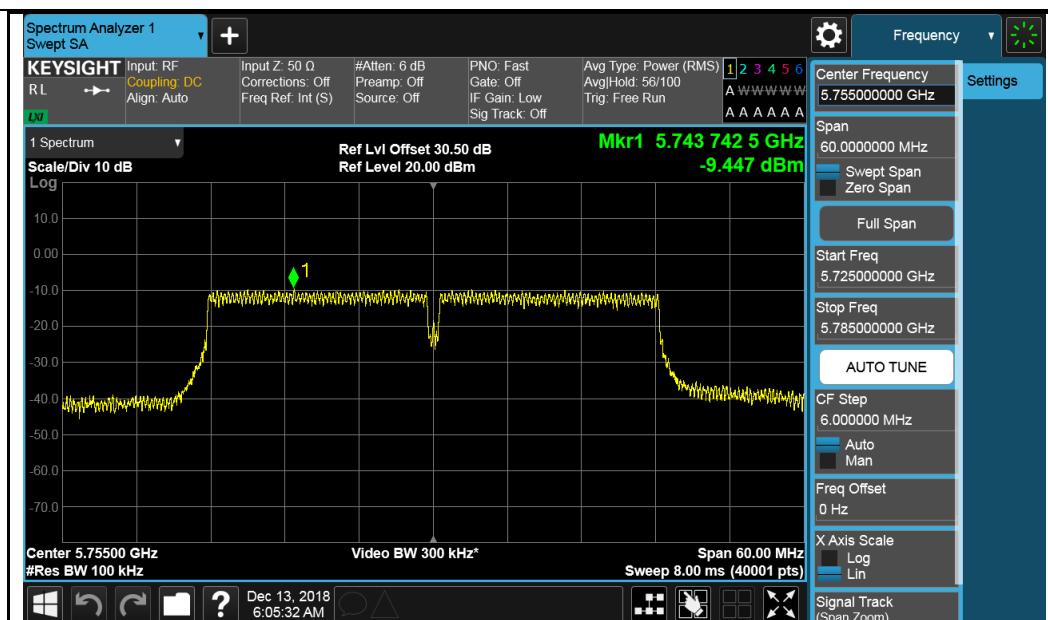


## Test Plot for W58:



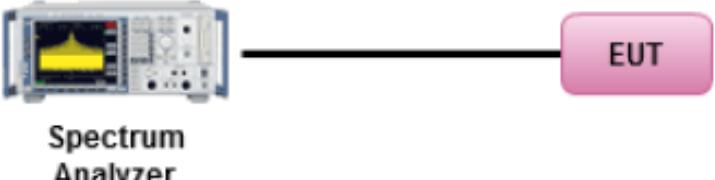






## 10.5 Band Edge and Emission Mask Measurement

### Requirement(s):

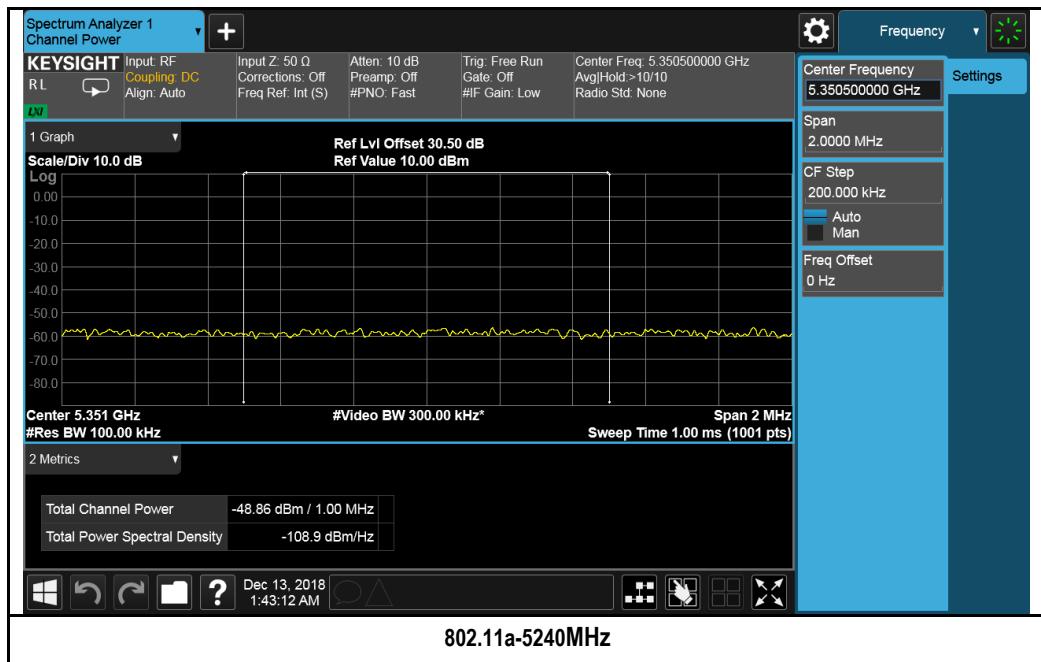
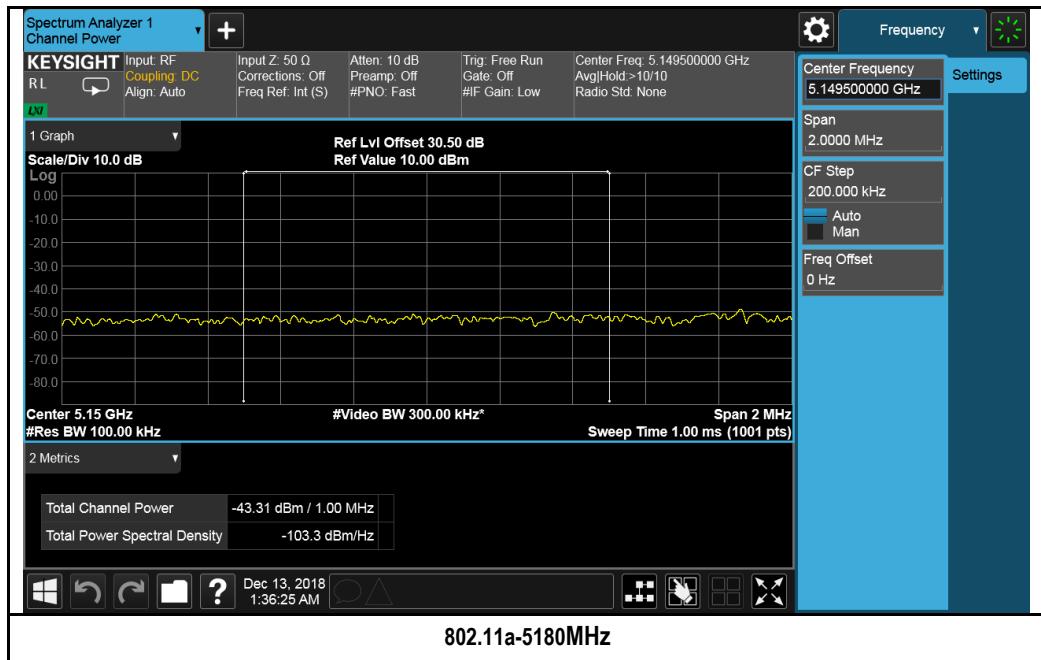
Spec	Item	Requirement	Applicable
47CFR§ 15.407(b)(2), 15.407(b)(6) RSS 247 Issue 2, 2017	(1)	For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.	<input checked="" type="checkbox"/>
	(4)	For transmitters operating in the 5.725-5.825 GHz band: all emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.	<input checked="" type="checkbox"/>
Test Setup	 <p><b>Spectrum Analyzer</b> ————— EUT</p>		
Procedure	<p>789033 D02 General U-NII Test Procedures New Rules v02r01, II.F. Method SA-1</p> <p><u>Band Edge measurement:</u></p> <ul style="list-style-type: none"> <li>- For average emissions measurements, follow the procedures described in section II.G.6., "Procedures for Average Unwanted Emissions Measurements above 1000 MHz", except for the following changes:</li> <li>- Set RBW=100kHz</li> <li>- Set VBW=300kHz</li> <li>- Perform a band-power integration across the 1 MHz bandwidth in which the band-edge emission level is to be measured.</li> </ul>		
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

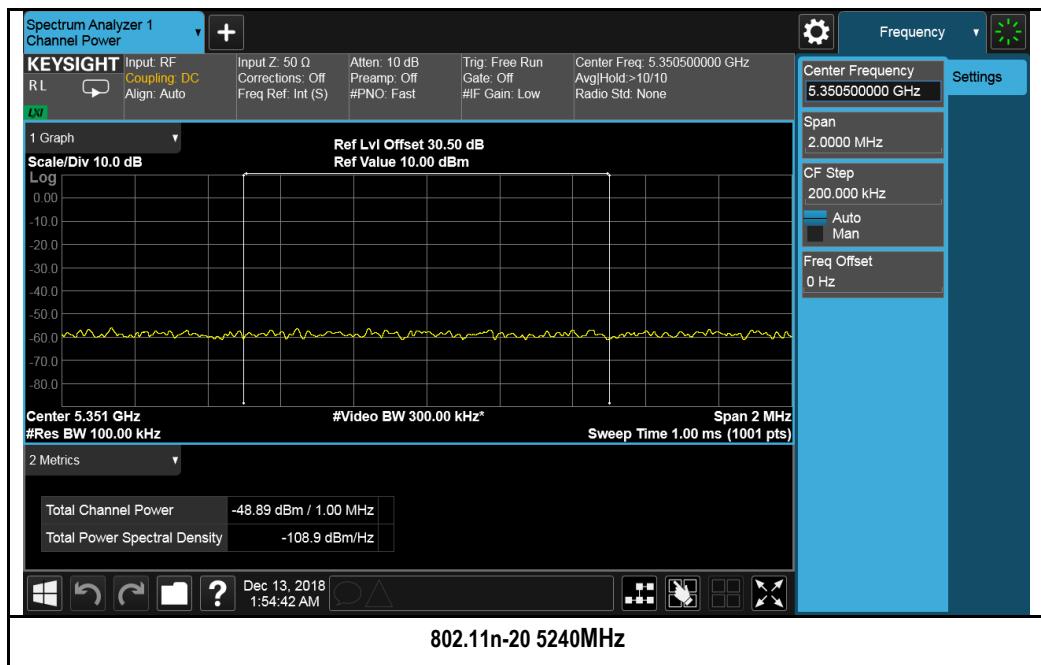
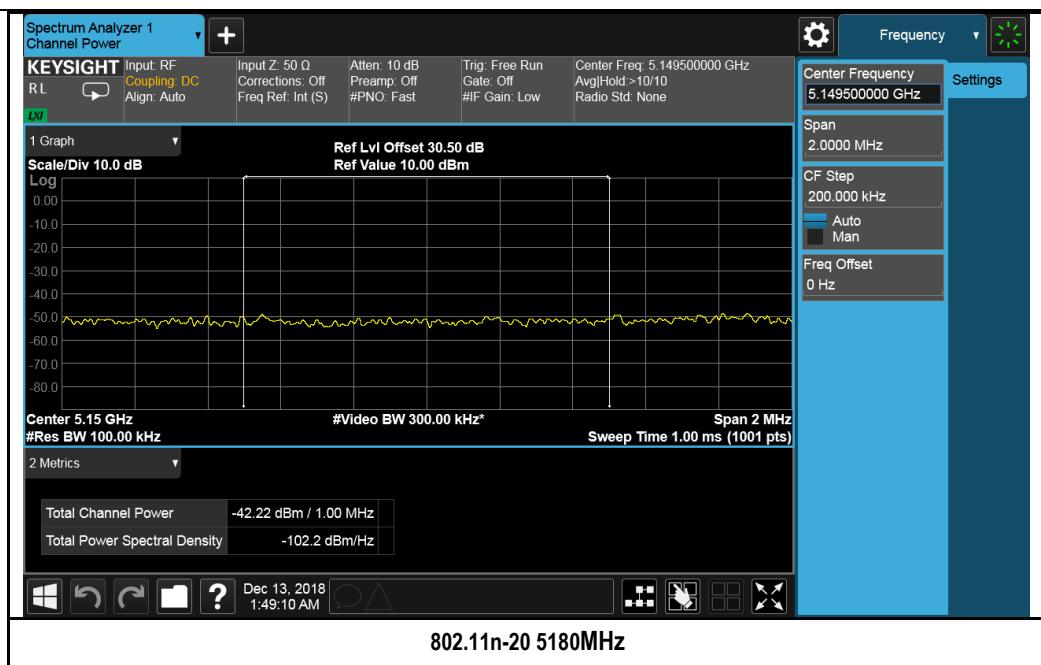
**Test Data**  Yes (See below)  N/A

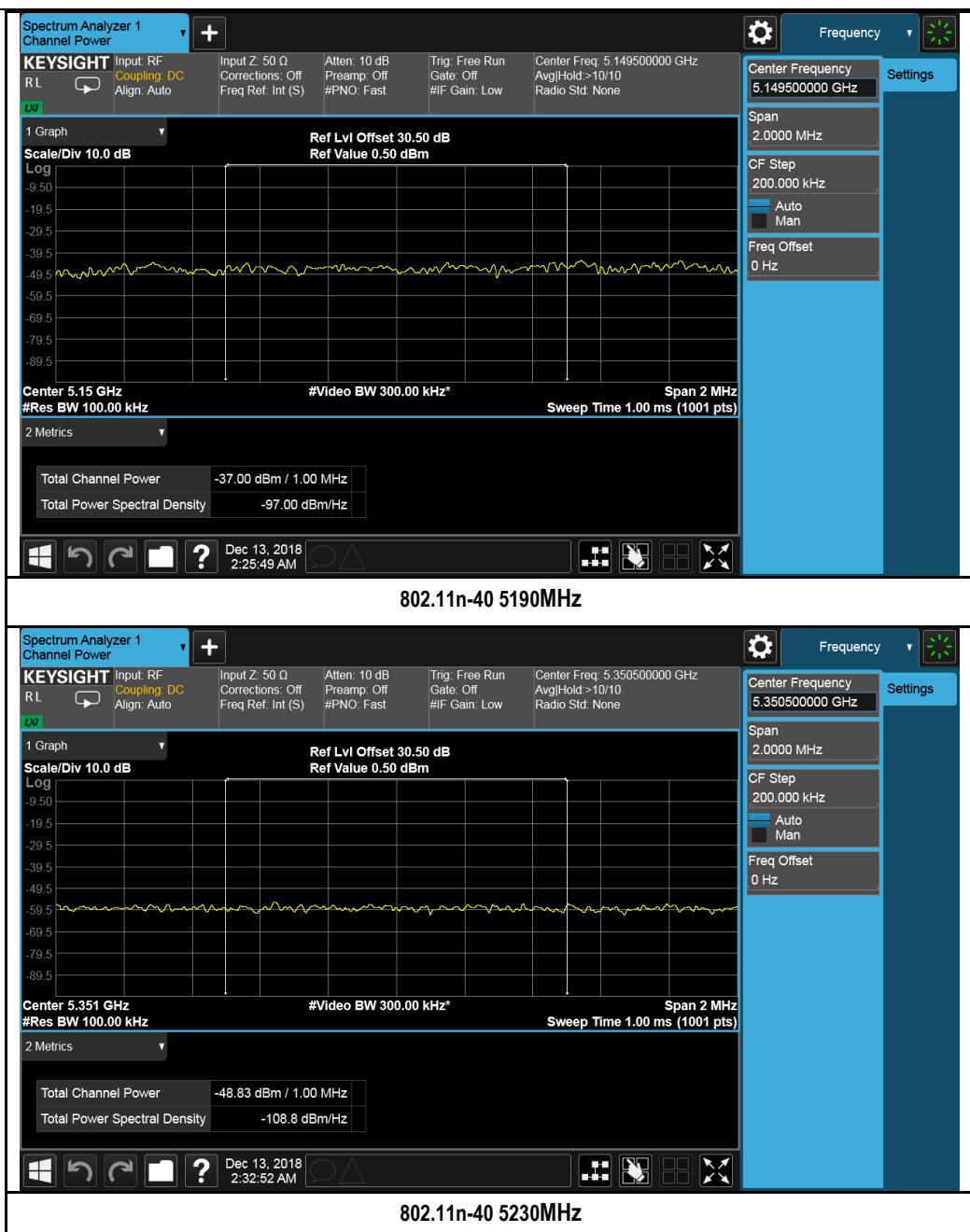
**Test Plot**  Yes (See below)  N/A

**Test was done by Gary Chou at RF test site.**

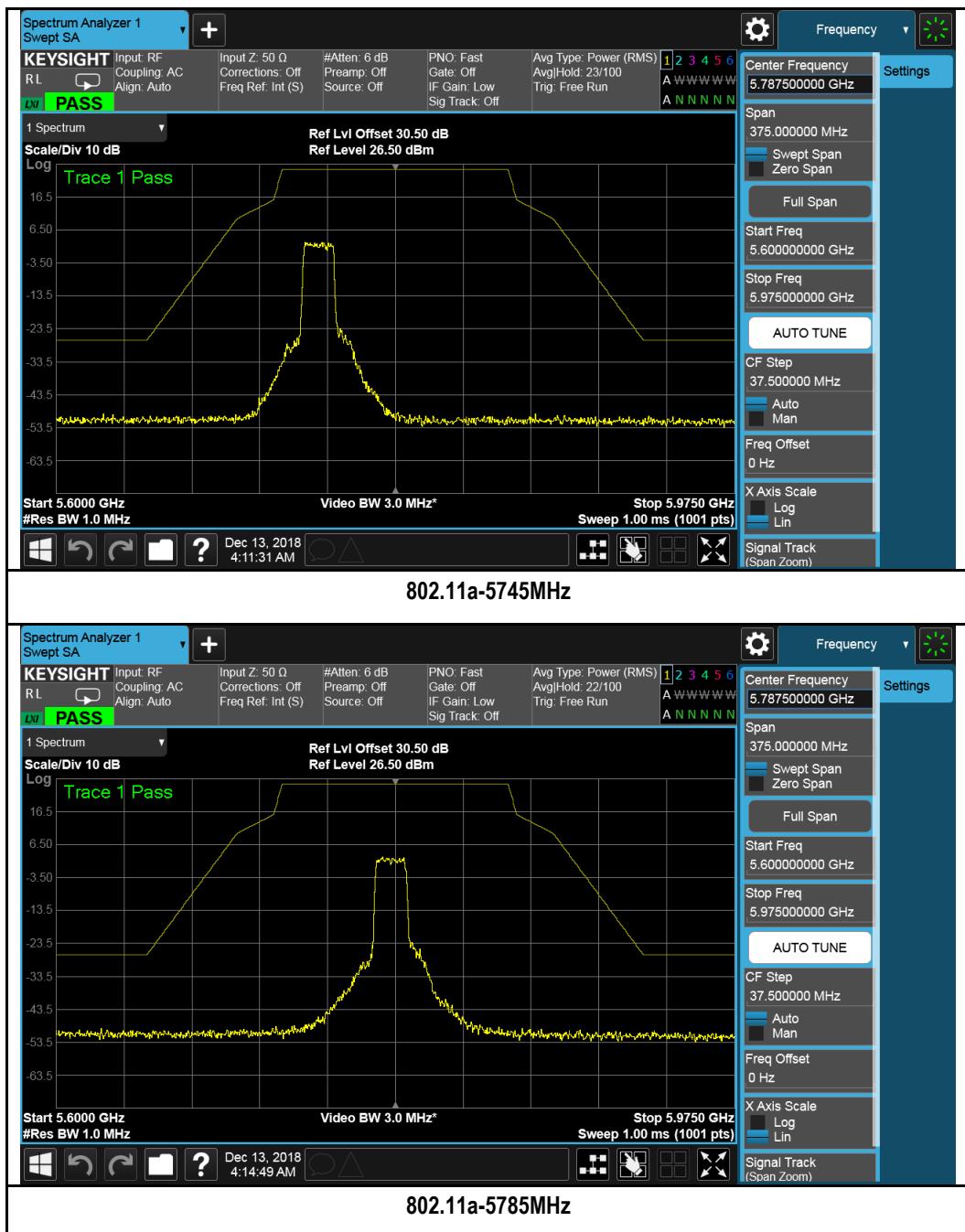
### Test Plot for W52:

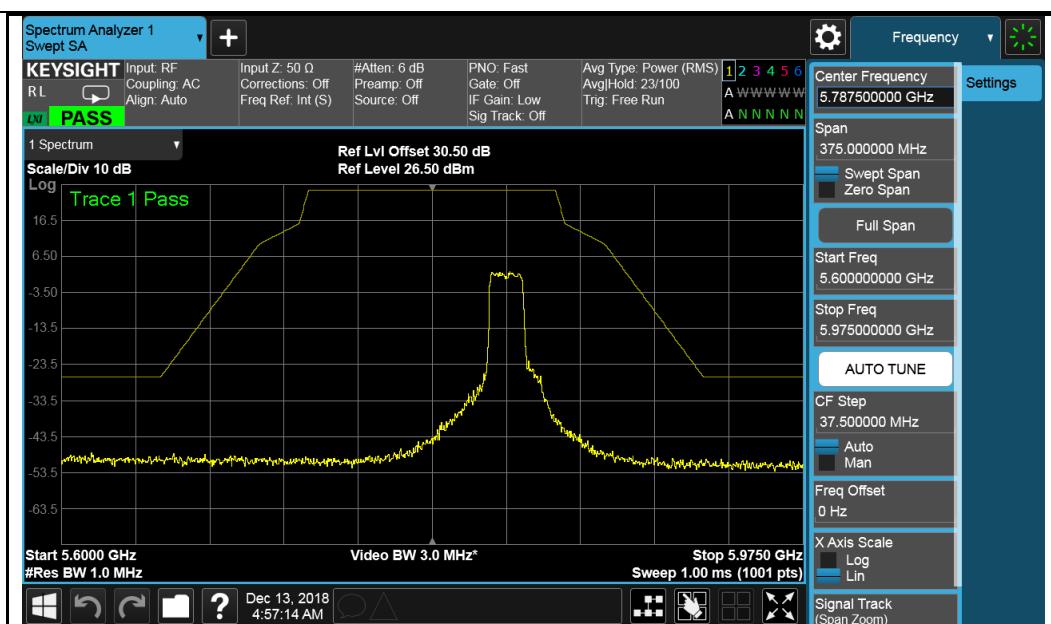




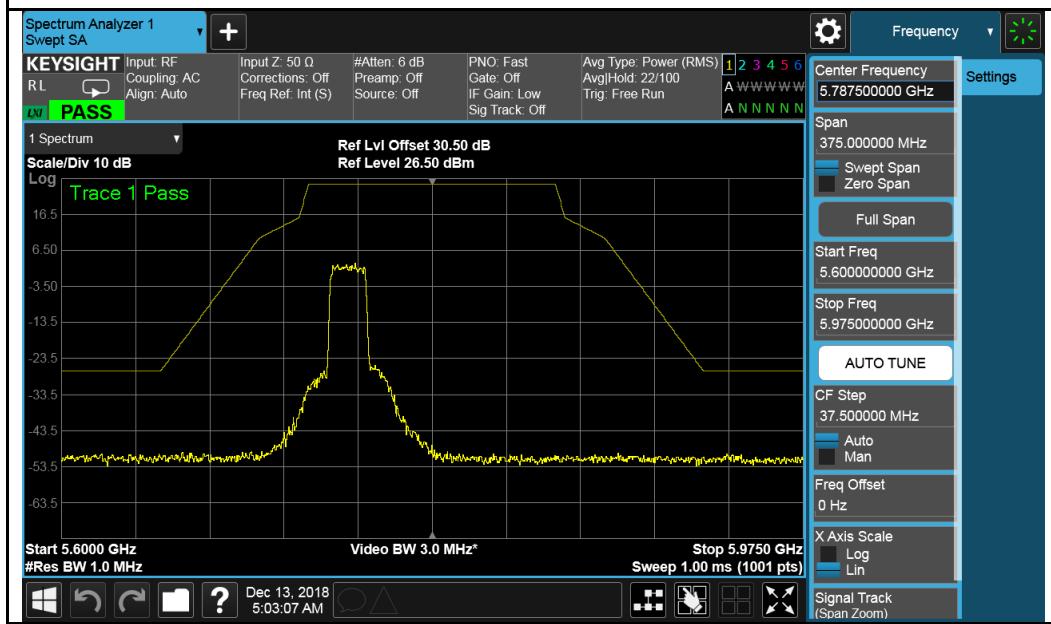


## Emission Mask Test Plots for W58:

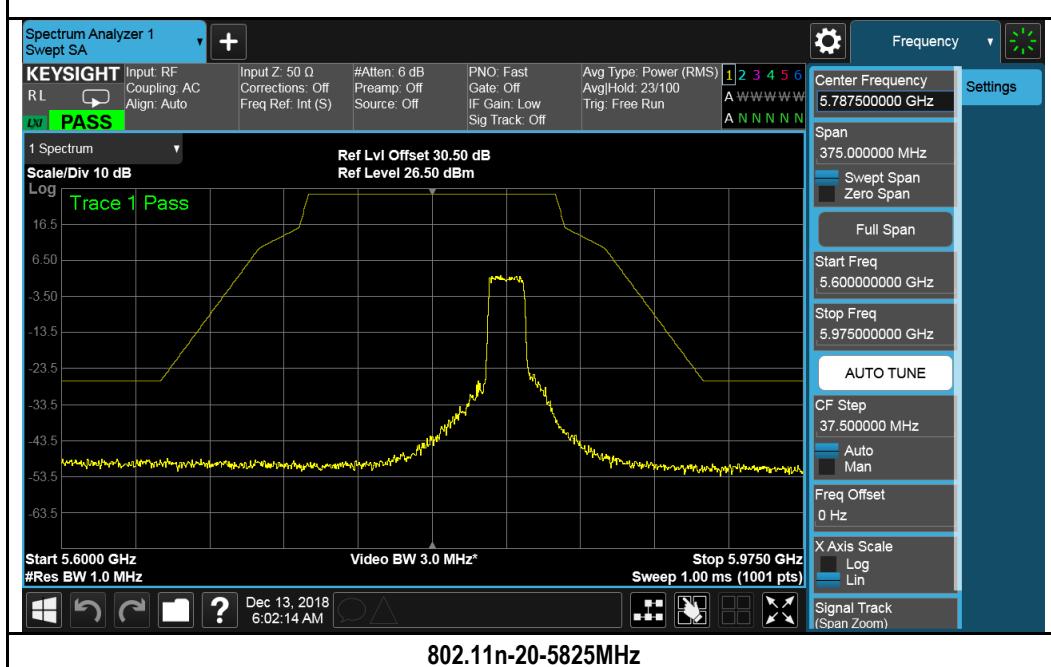
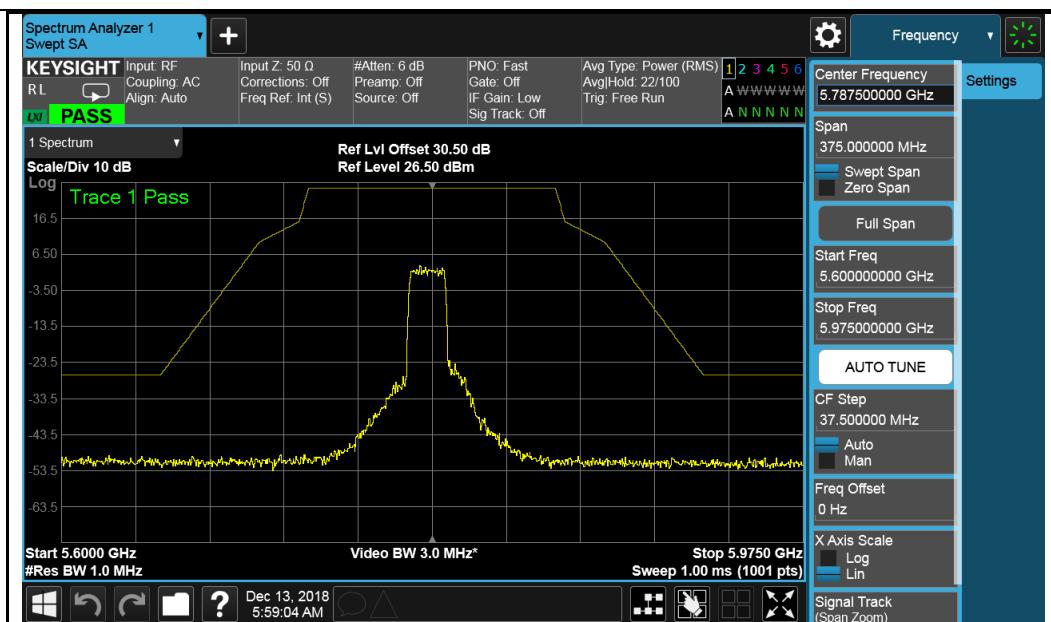


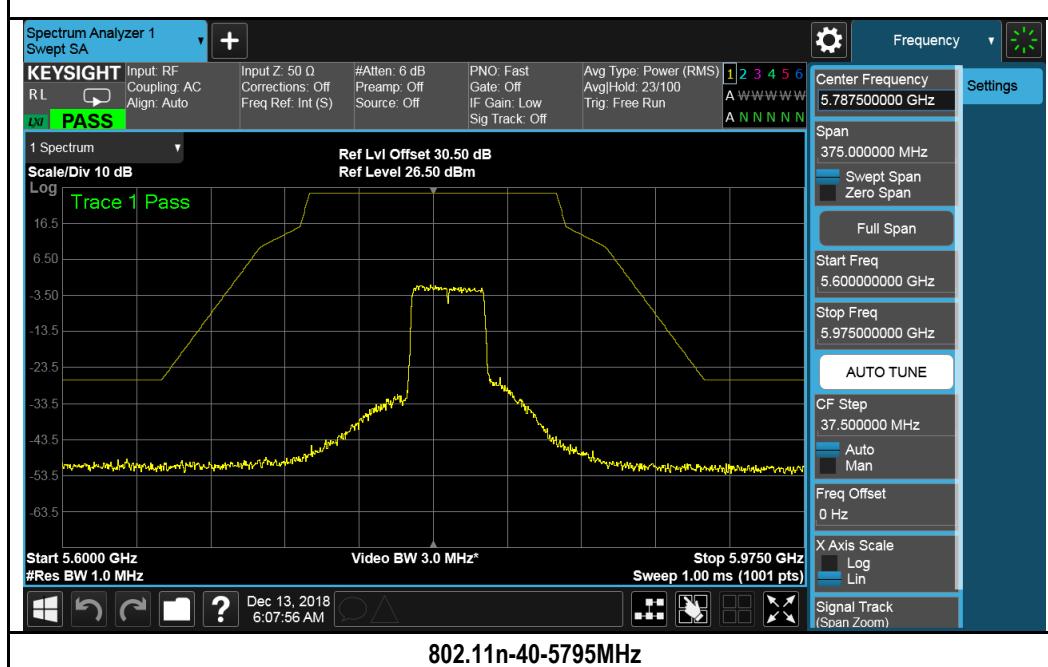
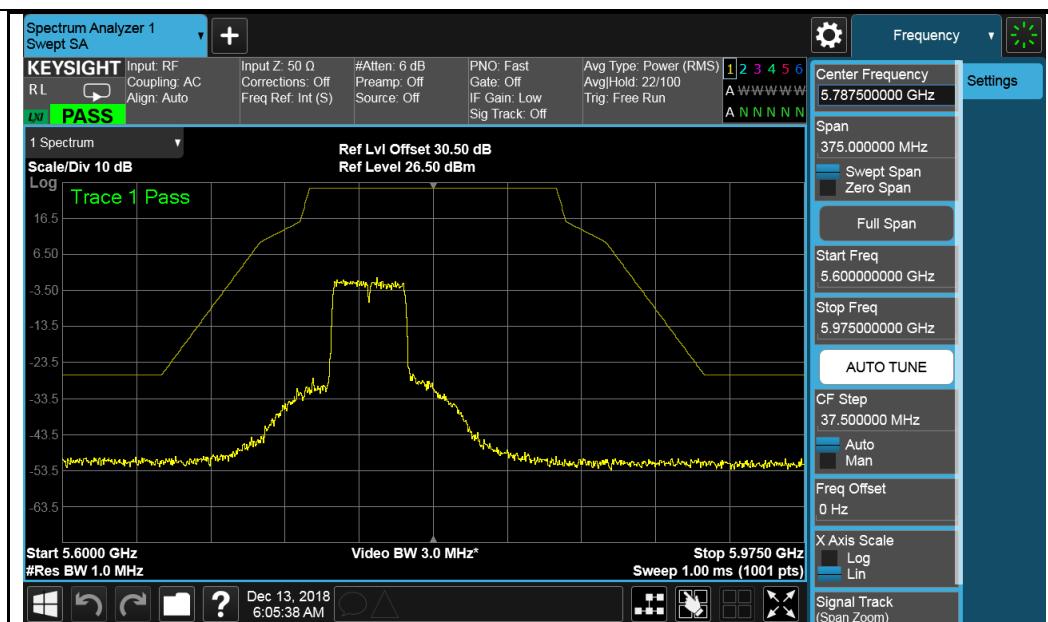


**802.11a-5825MHz**



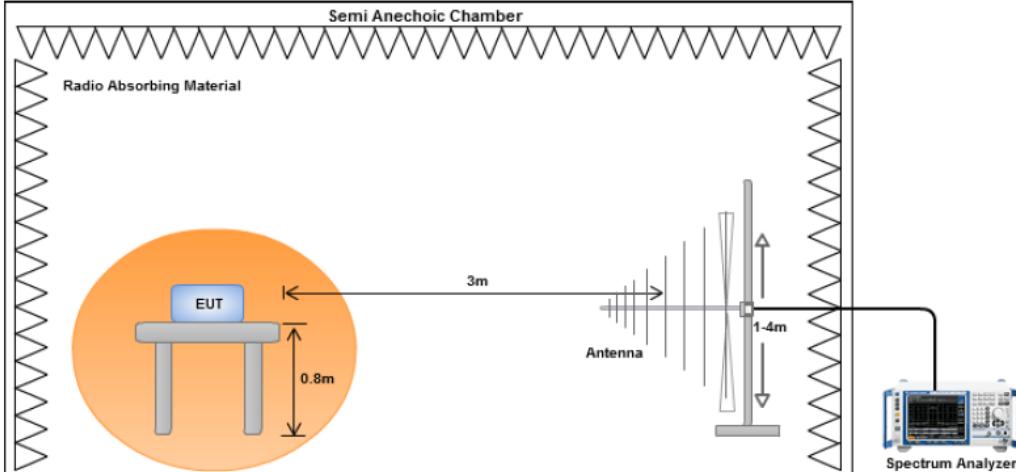
**802.11n-20-5745MHz**





## 10.6 Radiated Emissions below 1GHz

Requirement(s):

Spec	Requirement	Applicable										
47CFR§ 15.407(b) 15.209 (a) RSS Gen	<p>Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges</p> <table border="1"> <thead> <tr> <th>Frequency range (MHz)</th> <th>Field Strength (uV/m)</th> </tr> </thead> <tbody> <tr> <td>30 – 88</td> <td>100</td> </tr> <tr> <td>88 – 216</td> <td>150</td> </tr> <tr> <td>216 – 960</td> <td>200</td> </tr> <tr> <td>Above 960</td> <td>500</td> </tr> </tbody> </table>	Frequency range (MHz)	Field Strength (uV/m)	30 – 88	100	88 – 216	150	216 – 960	200	Above 960	500	<input checked="" type="checkbox"/>
Frequency range (MHz)	Field Strength (uV/m)											
30 – 88	100											
88 – 216	150											
216 – 960	200											
Above 960	500											
Test Setup												
Procedure	<ol style="list-style-type: none"> <li>1. The EUT was switched on and allowed to warm up to its normal operating condition.</li> <li>2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:             <ol style="list-style-type: none"> <li>a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.</li> <li>b. The EUT was then rotated to the direction that gave the maximum emission.</li> <li>c. Finally, the antenna height was adjusted to the height that gave the maximum emission. A Quasi-peak measurement was then made for that frequency point.</li> </ol> </li> <li>3. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.</li> </ol>											
Remark	The EUT was scanned up to 1GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.											
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail											

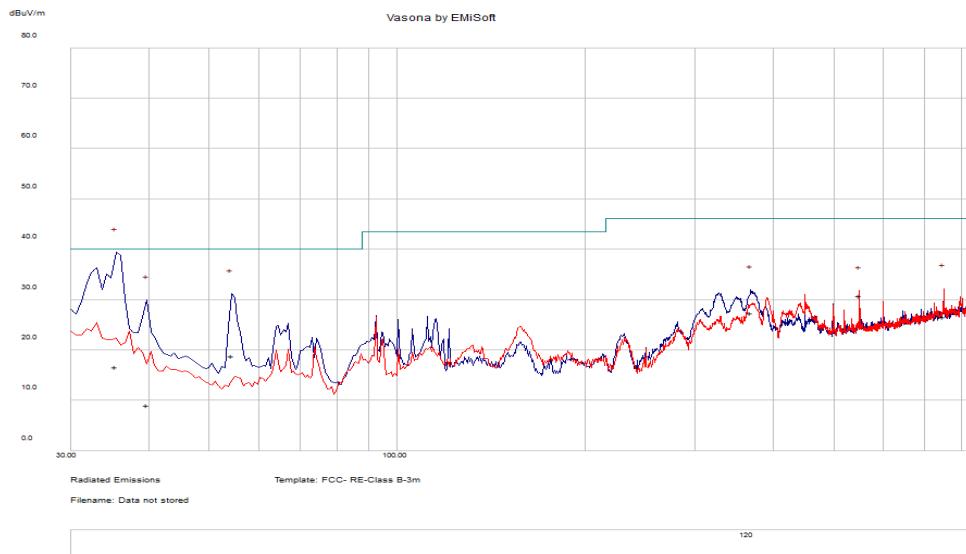
Test Data  Yes (See below)  N/A

Test Plot  Yes (See below)  N/A

Test was done by Gary Chou at 10m chamber.

## Radiated Emission Test Results (Below 1GHz)

Test specification	below 1GHz			
Environmental Conditions:	Temp (°C):	26	Result	
	Humidity (%)	47		
	Atmospheric (mbar):	1020		
	Mains Power:	120 Vac /60Hz		
Tested by:	Gary Chou			
Test Date:	12/05/2018			
Remarks:	802.11n40, 5795MHz			

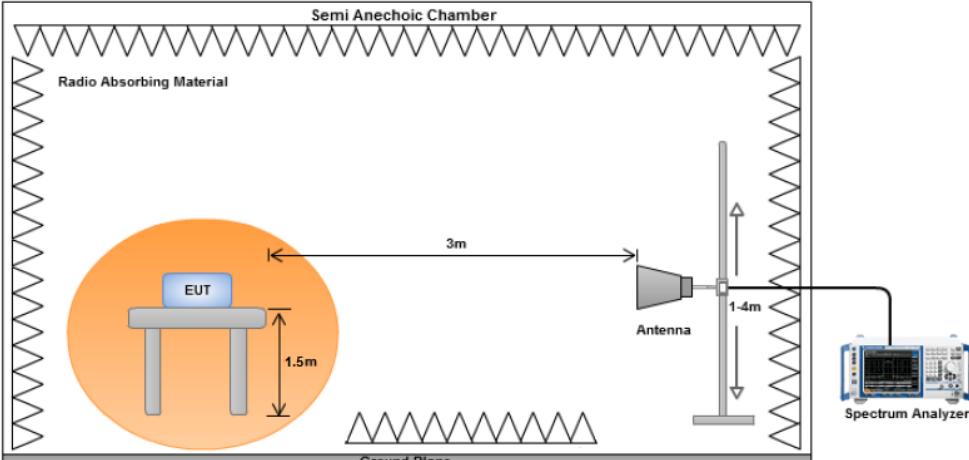


Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
35.399688	22.36	11.21	-16.87	16.7	Quasi Max	H	298	37	40	-23.3	Pass
54.414375	34.29	11.47	-26.9	18.86	Quasi Max	H	124	120	40	-21.14	Pass
39.792188	17.93	11.3	-20.17	9.05	Quasi Max	H	115	345	40	-30.95	Pass
749.97625	26.23	15.28	-14.92	26.59	Quasi Max	V	101	54	46	-19.41	Pass
368.308438	34.22	13.62	-20.49	27.35	Quasi Max	H	161	85	46	-18.65	Pass
549.9525	34.05	14.45	-17.72	30.78	Quasi Max	V	148	36	46	-15.22	Pass

Note: Both horizontal and vertical polarities were investigated. The results above show only the worst case.

## 10.7 Radiated Spurious Emissions above 1GHz

### Requirement(s):

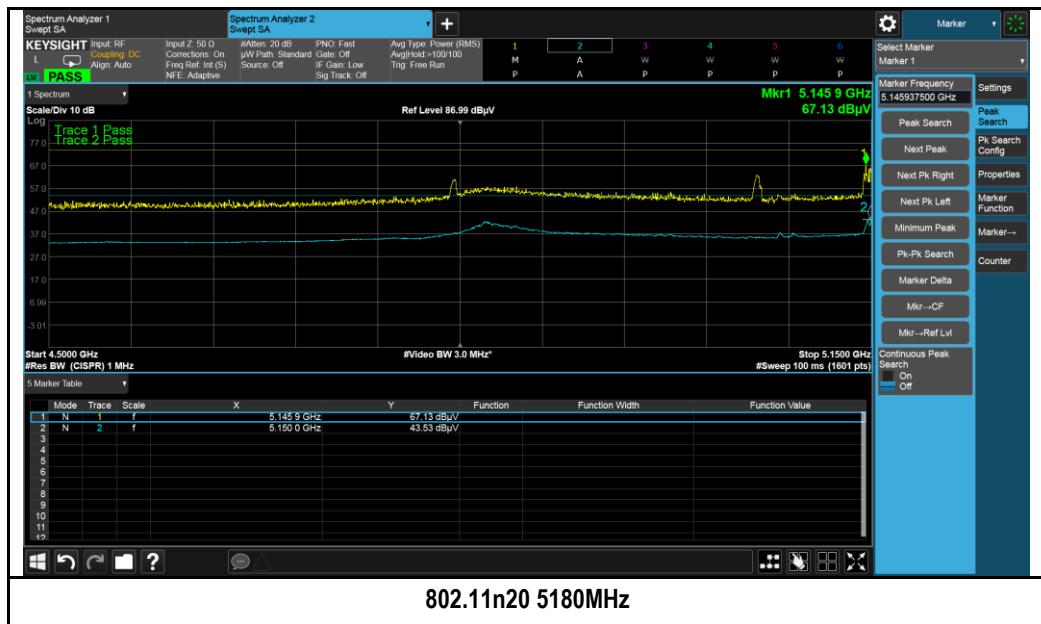
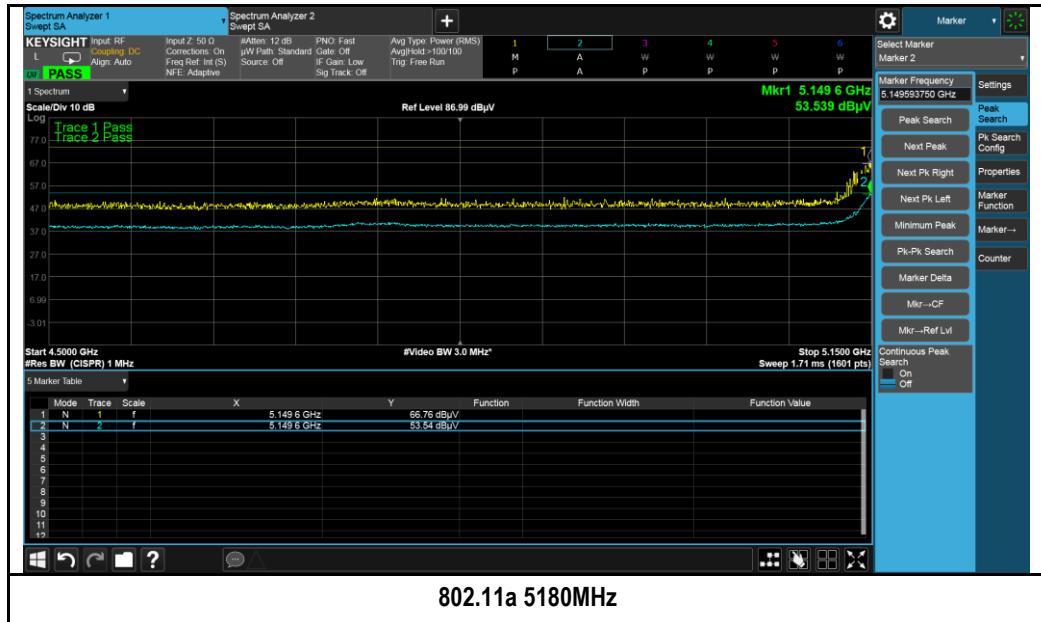
Spec	Item	Requirement	Applicable
47CFR§ 15.407(b)(2), 15.407(b)(6) RSS 247 Issue 2, 2017	(1)	For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.	<input checked="" type="checkbox"/>
	(2)	For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.	<input type="checkbox"/>
	(3)	For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz.	<input type="checkbox"/>
	(4)	For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.	<input checked="" type="checkbox"/>
	(5)	Restricted band, emission must also comply with the radiated emission limits specified in 15.209	<input checked="" type="checkbox"/>
Test Setup			
Procedure	1. 2. 3. 4.	<p>The EUT was switched on and allowed to warm up to its normal operating condition.</p> <p>The test was carried out at the selected frequency points obtained from the EUT characterisation.</p> <p>Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:</p> <ol style="list-style-type: none"> <li>Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.</li> <li>The EUT was then rotated to the direction that gave the maximum emission.</li> <li>Finally, the antenna height was adjusted to the height that gave the maximum emission.</li> </ol> <p>An average measurement was then made for that frequency point.</p> <p>Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.</p>	
Remark		The EUT was scanned up to 40GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

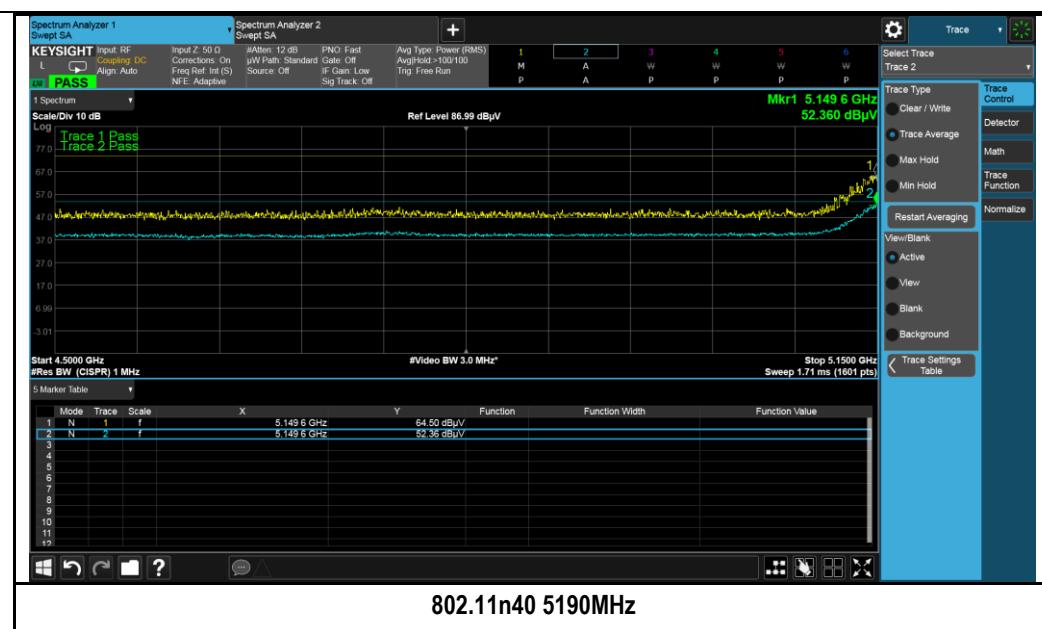
**Test Data**  Yes (See below)       N/A

**Test Plot**  Yes (See below)       N/A

**Test was done by Gary Chou at 10m chamber.**

## Restricted Band Measurement Plots:





## Radiated Emission Test Results (Above 1GHz)

### 1GHz-40GHz – 802.11a – 5180MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
7865.43	52.44	5.32	-7.15	50.61	Peak Max	H	266	298	74	-23.39	Pass
10360.52	54.26	6	-3.87	56.39	Peak Max	V	232	47	74	-17.61	Pass
13689.39	46.19	7.1	-1.54	51.75	Peak Max	V	166	156	74	-22.25	Pass
7865.28	39.37	5.32	-7.15	37.54	Average Max	H	266	298	54	-16.46	Pass
10360.41	40.14	6	-3.87	42.27	Average Max	H	232	47	54	-11.73	Pass
13689.15	33.26	7.1	-1.54	38.82	Average Max	V	166	156	54	-15.18	Pass

### 1GHz-40GHz – 802.11a – 5200MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
7623.44	51.47	5.17	-7.39	49.25	Peak Max	H	272	298	74	-24.75	Pass
10399.28	54.16	6.02	-3.85	56.33	Peak Max	V	225	43	74	-17.67	Pass
13290.39	46.25	7.01	-1.8	51.46	Peak Max	V	165	160	74	-22.54	Pass
7623.41	37.37	5.17	-7.39	35.15	Average Max	V	272	298	54	-18.85	Pass
10399.24	40.19	6.02	-3.85	42.36	Average Max	H	225	43	54	-11.64	Pass
13290.39	32.28	7.01	-1.8	37.49	Average Max	H	165	160	54	-16.51	Pass

### 1GHz-40GHz – 802.11a – 5240MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
7465.37	51.28	5.13	-7.56	48.85	Peak Max	V	267	295	74	-25.15	Pass
10480.43	54.36	6.07	-3.82	56.61	Peak Max	H	226	45	74	-17.39	Pass
13539.56	47.44	7.06	-1.56	52.94	Peak Max	V	167	158	74	-21.06	Pass
7465.28	38.53	5.13	-7.56	36.1	Average Max	V	267	295	54	-17.9	Pass
10480.39	40.29	6.07	-3.82	42.54	Average Max	V	226	45	54	-11.46	Pass
13539.44	34.45	7.06	-1.56	39.95	Average Max	V	167	158	54	-14.05	Pass

### 1GHz-40GHz – 802.11n20 – 5180MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
7865.85	52.29	5.32	-7.15	50.46	Peak Max	H	266	298	74	-23.54	Pass
10360.17	54.13	6	-3.87	56.26	Peak Max	V	232	47	74	-17.74	Pass
13689.86	46.84	7.1	-1.54	52.4	Peak Max	V	166	156	74	-21.6	Pass
7865.85	39.17	5.32	-7.15	37.34	Average Max	H	266	298	54	-16.66	Pass
10360.17	40.49	6	-3.87	42.62	Average Max	H	232	47	54	-11.38	Pass
13689.86	33.33	7.1	-1.54	38.89	Average Max	V	166	156	54	-15.11	Pass

### 1GHz-40GHz – 802.11n20 – 5200MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
7623.57	51.43	5.17	-7.39	49.21	Peak Max	H	272	298	74	-24.79	Pass
10399.79	54.53	6.02	-3.85	56.7	Peak Max	V	225	43	74	-17.3	Pass
13290.85	46.39	7.01	-1.8	51.6	Peak Max	V	165	160	74	-22.4	Pass
7623.57	37.89	5.17	-7.39	35.67	Average Max	V	272	298	54	-18.33	Pass
10399.79	40.82	6.02	-3.85	42.99	Average Max	H	225	43	54	-11.01	Pass
13290.85	32.91	7.01	-1.8	38.12	Average Max	H	165	160	54	-15.88	Pass

### 1GHz-40GHz – 802.11n20 – 5240MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
7465.03	51.69	5.13	-7.56	49.26	Peak Max	V	267	295	74	-24.74	Pass
10480.64	54.56	6.07	-3.82	56.81	Peak Max	H	226	45	74	-17.19	Pass
13539.55	47.28	7.06	-1.56	52.78	Peak Max	V	167	158	74	-21.22	Pass
7465.03	38.38	5.13	-7.56	35.95	Average Max	V	267	295	54	-18.05	Pass
10480.64	40.71	6.07	-3.82	42.96	Average Max	V	226	45	54	-11.04	Pass
13539.55	34.26	7.06	-1.56	39.76	Average Max	V	167	158	54	-14.24	Pass

**1GHz-40GHz – 802.11n40 – 5190MHz**

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
7601.31	51.54	5.17	-7.46	49.25	Peak Max	H	264	299	74	-24.75	Pass
10379.08	53.78	6.01	-3.86	55.93	Peak Max	V	228	45	74	-18.07	Pass
13894.41	46.67	7.22	-1.64	52.25	Peak Max	V	161	161	74	-21.75	Pass
7601.31	38.02	5.17	-7.46	35.73	Average Max	V	264	299	54	-18.27	Pass
10379.08	40.75	6.01	-3.86	42.9	Average Max	V	228	45	54	-11.1	Pass
13894.41	32.91	7.22	-1.64	38.49	Average Max	H	161	161	54	-15.51	Pass

**1GHz-40GHz – 802.11n40 – 5230MHz**

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
7434.68	51.55	5.14	-7.58	49.11	Peak Max	H	265	303	74	-24.89	Pass
10460.31	54.79	6.06	-3.83	57.02	Peak Max	H	225	47	74	-16.98	Pass
13944.77	48.35	7.25	-1.6	54	Peak Max	V	162	157	74	-20	Pass
7434.68	37.98	5.14	-7.58	35.54	Average Max	V	265	303	54	-18.46	Pass
10460.31	41.08	6.06	-3.83	43.31	Average Max	H	225	47	54	-10.69	Pass
13944.77	35	7.25	-1.6	40.65	Average Max	H	162	157	54	-13.35	Pass

**1GHz-40GHz – 802.11a – 5745MHz**

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
7012.39	51.52	5.08	-7.81	48.79	Peak Max	H	264	296	74	-25.21	Pass
11490.28	55.37	6.07	-2.79	58.65	Peak Max	V	227	41	74	-15.35	Pass
13834.44	47.44	7.18	-1.69	52.93	Peak Max	H	161	155	74	-21.07	Pass
7012.23	37.51	5.08	-7.81	34.78	Average Max	H	264	296	54	-19.22	Pass
11490.52	41.36	6.07	-2.79	44.64	Average Max	V	227	41	54	-9.36	Pass
13834.19	34.42	7.18	-1.69	39.91	Average Max	H	161	155	54	-14.09	Pass

**1GHz-40GHz - 802.11a- 5785MHz**

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
7891.37	50.13	5.34	-7.13	48.34	Peak Max	H	264	295	74	-25.66	Pass
11569.42	54.25	6.13	-2.68	57.7	Peak Max	H	225	43	74	-16.3	Pass
13070.62	46.47	6.93	-1.75	51.65	Peak Max	H	167	157	74	-22.35	Pass
7891.37	37.82	5.34	-7.13	36.03	Average Max	V	264	295	54	-17.97	Pass
11569.42	41.65	6.13	-2.68	45.1	Average Max	V	225	43	54	-8.9	Pass
13070.62	33.28	6.93	-1.75	38.46	Average Max	H	167	157	54	-15.54	Pass

**1GHz-40GHz - 802.11a - 5825MHz**

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
7315.53	52.27	5.15	-7.66	49.76	Peak Max	V	273	304	74	-24.24	Pass
11650.19	55.46	6.2	-2.52	59.14	Peak Max	V	234	47	74	-14.86	Pass
13444.38	46.34	7.04	-1.61	51.77	Peak Max	V	166	162	74	-22.23	Pass
7315.53	39.24	5.15	-7.66	36.73	Average Max	V	273	304	54	-17.27	Pass
11650.19	41.57	6.2	-2.52	45.25	Average Max	H	234	47	54	-8.75	Pass
13444.38	32.19	7.04	-1.61	37.62	Average Max	H	166	162	54	-16.38	Pass

**1GHz-40GHz - 802.11n20 - 5745MHz**

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
7012.26	51.27	5.08	-7.81	48.54	Peak Max	H	264	296	74	-25.46	Pass
11490.54	55.04	6.07	-2.79	58.32	Peak Max	V	227	41	74	-15.68	Pass
13834.72	47.42	7.18	-1.69	52.91	Peak Max	H	161	155	74	-21.09	Pass
7012.26	37.82	5.08	-7.81	35.09	Average Max	H	264	296	54	-18.91	Pass
11490.54	41.71	6.07	-2.79	44.99	Average Max	V	227	41	54	-9.01	Pass
13834.72	34.08	7.18	-1.69	39.57	Average Max	H	161	155	54	-14.43	Pass

**1GHz-40GHz - 802.11n20- 5785MHz**

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
7891.31	50.61	5.34	-7.13	48.82	Peak Max	H	264	295	74	-25.18	Pass
11569.93	54.35	6.13	-2.68	57.8	Peak Max	H	225	43	74	-16.2	Pass
13070.20	46.57	6.93	-1.75	51.75	Peak Max	H	167	157	74	-22.25	Pass
7891.31	37.35	5.34	-7.13	35.56	Average Max	V	264	295	54	-18.44	Pass
11569.93	41.27	6.13	-2.68	44.72	Average Max	V	225	43	54	-9.28	Pass
13070.20	33.3	6.93	-1.75	38.48	Average Max	H	167	157	54	-15.52	Pass

**1GHz-40GHz - 802.11n20 - 5825MHz**

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
7315.81	52.37	5.15	-7.66	49.86	Peak Max	V	273	304	74	-24.14	Pass
11650.91	55.38	6.2	-2.52	59.06	Peak Max	V	234	47	74	-14.94	Pass
13444.18	46.62	7.04	-1.61	52.05	Peak Max	V	166	162	74	-21.95	Pass
7315.81	39.03	5.15	-7.66	36.52	Average Max	V	273	304	54	-17.48	Pass
11650.91	41.67	6.2	-2.52	45.35	Average Max	H	234	47	54	-8.65	Pass
13444.18	32.79	7.04	-1.61	38.22	Average Max	H	166	162	54	-15.78	Pass

**1GHz-40GHz - 802.11n40 – 5755MHz**

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
7741.38	53.13	5.22	-7.26	51.09	Peak Max	H	268	299	74	-22.91	Pass
11509.56	55.24	6.08	-2.77	58.55	Peak Max	H	234	46	74	-15.45	Pass
13443.36	46.64	7.04	-1.61	52.07	Peak Max	H	164	153	74	-21.93	Pass
7741.38	39.27	5.22	-7.26	37.23	Average Max	H	268	299	54	-16.77	Pass
11509.56	42.17	6.08	-2.77	45.48	Average Max	H	234	46	54	-8.52	Pass
13443.36	33.25	7.04	-1.61	38.68	Average Max	H	164	153	54	-15.32	Pass

**1GHz-40GHz - 802.11n40 – 5795MHz**

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
7719.31	51.2	5.21	-7.27	49.14	Peak Max	H	266	297	74	-24.86	Pass
11590.45	56.19	6.15	-2.65	59.69	Peak Max	H	229	50	74	-14.31	Pass
13216.93	46.92	6.99	-1.9	52.01	Peak Max	H	161	158	74	-21.99	Pass
7719.31	37.77	5.21	-7.27	35.71	Average Max	V	266	297	54	-18.29	Pass
11590.45	43.11	6.15	-2.65	46.61	Average Max	V	229	50	54	-7.39	Pass
13216.93	33.37	6.99	-1.9	38.46	Average Max	V	161	158	54	-15.54	Pass

## Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
<b>Conducted Emissions</b>						
R & S Receiver	ESIB 40	100179	06/08/2018	1 Year	06/08/2019	<input checked="" type="checkbox"/>
LISN (9kHz - 30MHz)	3816/2NM	214372	09/27/2018	1 Year	09/27/2019	<input checked="" type="checkbox"/>
<b>Radiated Emissions</b>						
50GHz Spectrum Analyzer	N9030B (PXA)	MY57140584	1/3/2018	1 Year	1/2/2019	<input checked="" type="checkbox"/>
Broadband Hybrid Antenna (30MHz - 6GHz)	JB6	A111717	12/04/2018	1 Year	12/03/2019	<input checked="" type="checkbox"/>
Horn Antenna (1GHz~26GHz)	3115	100059	01/25/2018	1 Year	01/26/2019	<input checked="" type="checkbox"/>
Horn Antenna (26GHz~40GHz)	AH-840	101013	08/27/2018	1 Year	08/28/2019	<input checked="" type="checkbox"/>
Pre-Amp (30MHz~40GHz)	LPA-6-30	11140711	02/09/2018	1 Year	02/10/2019	<input checked="" type="checkbox"/>
<b>RF Conducted Measurement</b>						
50GHz Spectrum Analyzer	N9030B (PXA)	MY57140584	1/3/2018	1 Year	1/2/2019	<input checked="" type="checkbox"/>

\* CALIBRATION EXTENDED BY 3 MONTHS

## Annex B. SIEMIC Accreditation

Accreditations	Document	Scope / Remark
ISO 17025 (A2LA)		Please see the documents for the detailed scope
ISO Guide 65 (A2LA)		Please see the documents for the detailed scope
TCB Designation		<a href="#">A1</a> , <a href="#">A2</a> , <a href="#">A3</a> , <a href="#">A4</a> , <a href="#">B1</a> , <a href="#">B2</a> , <a href="#">B3</a> , <a href="#">B4</a> , C
FCC DoC Accreditation		FCC Declaration of Conformity Accreditation
FCC Site Registration		3 meter site
FCC Site Registration		10 meter site
IC Site Registration		3 meter site
IC Site Registration		10 meter site
EU NB		<b>Radio &amp; Telecommunications Terminal Equipment:</b> EN45001 – EN ISO/IEC 17025
		<b>Electromagnetic Compatibility:</b> EN45001 – EN ISO/IEC 17025
Singapore iDA CB(Certification Body)	 	<a href="#">Phase I</a> , <a href="#">Phase II</a>
Vietnam MIC CAB Accreditation		Please see the document for the detailed scope
Hong Kong OFCA		<b>(Phase II)</b> OFCA Foreign Certification Body for Radio and Telecom
		<b>(Phase I)</b> Conformity Assessment Body for Radio and Telecom
Industry Canada CAB		<b>Radio:</b> Scope A – All Radio Standard Specification in Category I
		<b>Telecom:</b> CS-03 Part I, II, V, VI, VII, VIII

Japan Recognized Certification Body Designation		<b>Radio:</b> A1. Terminal equipment for purpose of calling <b>Telecom:</b> B1. Specified radio equipment specified in Article 38-2, Paragraph 1, Item 1 of the Radio Law
Korea CAB Accreditation		<b>EMI:</b> KCC Notice 2008-39, RRL Notice 2008-3: CA Procedures for EMI KN22: Test Method for EMI <b>EMS:</b> KCC Notice 2008-38, RRL Notice 2008-4: CA Procedures for EMS KN24, KN61000-4-2, -4-3, -4-4, -4-5, -4-6, -4-8, -4-11: Test Method for EMS
Taiwan NCC CAB Recognition		<b>Radio:</b> RRL Notice 2008-26, RRL Notice 2008-2, RRL Notice 2008-10, RRL Notice 2007-49, RRL Notice 2007-20, RRL Notice 2007-21, RRL Notice 2007-80, RRL Notice 2004-68 <b>Telecom:</b> President Notice 20664, RRL Notice 2007-30, RRL Notice 2008-7 with attachments 1, 3, 5, 6; President Notice 20664, RRL Notice 2008-7 with attachment 4
Taiwan BSMI CAB Recognition		LP0002, PSTN01, ADSL01, ID0002, IS6100, CNS14336, PLMN07, PLMN01, PLMN08
Japan VCCI		CNS 13438
Australia CAB Recognition		<b>EMC:</b> AS/NZS CISPR 11, AS/NZS CISPR 14.1, AS/NZS CISPR22, AS/NZS 61000.6.3, AS/NZS 61000.6.4 <b>Radio communications:</b> AS/NZS 4281, AS/NZS 4268, AS/NZS 4280.1, AS/NZS 4280.2, AS/NZS 4295, AS/NZS 4582, AS/NZS 4583, AS/NZS 4769.1, AS/NZS 4769.2, AS/NZS 4770, AS/NZS 4771 <b>Telecommunications:</b> AS/ACIF S002:05, AS/ACIF S003:06, AS/ACIF S004:06 AS/ACIF S006:01, AS/ACIF S016:01, AS/ACIF S031:01, AS/ACIF S038:01, AS/ACIF S040:01, AS/ACIF S041:05, AS/ACIF S043.2:06, AS/ACIF S60950.1
Australia NATA Recognition		AS/ACIF S002, AS/ACIF S003, AS/ACIF S004, AS/ACIF S006, AS/ACIF S016, AS/ACIF S031, AS/ACIF S038, AS/ACIF S040, AS/ACIF S041, AS/ACIF S043.2