RF TEST REPORT

Report No.: FCC_SL17072501-RUC-022A3_W53W56
Supersede Report No.:

Applicant	:	Ruckus Wireless, Inc.
Product Name	:	E510 Access Point
Model No.	:	E510
Test Standard	:	47 CFR 15.407
Test Method	:	ANSI C63.4: 2014 789033 D02 General UNII Test Procedures New Rules v01
FCC ID	:	S9GE510
IC ID	:	5912A-E510
Dates of test	:	10/24/2017-02/08/2018
Issue Date	:	02/09/2018
Test Result	:	☒ Pass ☐ Fail
Equipment complied with the specification [X] Equipment did not comply with the specification [ ]		

This Test Report is Issued Under the Authority of:	
Gary Chou	
Gary Chou	Chen Ge
Test Engineer	Engineer Reviewer
This test report may be reproduced in full only Test result presented in this test report is applicable to the tested sample only	

Issued By:
SIEMIC Laboratories
775 Montague Expressway, Milpitas, 95035 CA

ACCREDITED
TESTING CERT # 2742.01

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
FCC_SL17072501-RUC-022A3_W53W56	None	Original	02/09/2018

2 Executive Summary

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

Company: Ruckus Wireless, Inc.
Product: E510 Access Point
Model: E510

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

3 Customer information

Applicant Name	:	Ruckus Wireless, Inc.
Applicant Address	:	350 West Java Drive, Sunnyvale, California 94089 U.S.A
Manufacturer Name	:	Ruckus Wireless, Inc.
Manufacturer Address	:	350 West Java Drive, Sunnyvale, California 94089 U.S.A

4 Test site information

Lab performing tests	SIEMIC Laboratories
Lab Address	775 Montague Expressway, Milpitas, CA 95035
FCC Test Site No.	881796
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	E510 Access Point
Model No.	E510
Trade Name	Ruckus
Serial No.	361706000066
Host Model No.	N/A
Input Power	48VDC (PoE)
Power Adapter Manu/Model	N/A
Power Adapter SN	N/A
Date of EUT received	10/20/2017
Equipment Class/ Category	DTS, UNII
Port/Connectors	PoE, Ethernet

6.2 Radio Description

Radio Type	802.11a	802.11n-20M	802.11n-40M	802.11ac-80M
Operating Frequency	5260-5320MHz 5500-5720MHz	5260-5320MHz 5500-5720MHz	5270-5310MHz 5510-5710MHz	5290MHz, 5530MHz 5610MHz, 5690MHz
Modulation	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Channel Spacing	20MHz	20MHz	40MHz	80MHz
Number of Channels	16	16	6	4
Antenna Type	External sector M Antenna			
Antenna Gain (Peak)	5GHz: 5 dBi			
Antenna Connector Type	Reversed SMA			
Note	2.4GHz and 5GHz Radio transmit simultaneously			

EUT Power level setting

Mode	Frequency	Power Setting
802.11-a	5260	42
802.11-a	5280	42
802.11-a	5320	40
802.11-n-20	5260	42
802.11-n-20	5280	42
802.11-n-20	5320	40
802.11-n-40	5270	43
802.11-n-40	5310	38
802.11-ac-80	5290	38
802.11-a	5500	40
802.11-a	5580	40
802.11-a	5700	40
802.11-n-20	5500	40
802.11-n-20	5580	40
802.11-n-20	5700	40
802.11-n-40	5510	38
802.11-n-40	5590	42
802.11-n-40	5670	40
802.11-ac-80	5530	36
802.11-ac-80	5610	40

CROSS Band channels power setting

Mode	Frequency	Power Setting
802.11-a	5720	40
802.11-n-20	5720	40
802.11-n-40	5710	40
802.11-ac-80	5690	40

Note: All data rate has been verified and worst case was used for all test items.

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Laptop	VOSTRO 1520	26543939185	Dell	-

7.2 Cabling Description

Item	Connection Start		Connection Stop		Length / shielding Info		Note
	From	I/O Port	To	I/O Port	Length (m)	Shielding	
1	EUT	RJ45	Power Over Ethernet Injector	RJ45	>3m	N/A	-
2	Laptop	RJ45	Power Over Ethernet Injector	RJ45	>3m	N/A	

7.3 Test Software Description

Test Item	Software	Description
RF Testing	Command prompt	Set the EUT to transmit continuously in diferent test mode

8 Test Summary

Test Item	Test standard		Test Method/Procedure	Pass / Fail
Restricted Band of Operation	FCC	15.205	ANSI C63.4 – 2014 789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
AC Conducted Emissions Voltage	FCC	15.207(a)	ANSI C63.4 – 2014	☒ Pass* ☐ N/A

Test Item	Test standard		Test Method/Procedure	Pass / Fail
26 & 6 dB Emission Bandwidth	FCC	15.407 (a) (2)	789033 D02 General UNII Test Procedures New Rules v01	☒ Pass* ☐ N/A
Maximum conducted Output Power	FCC	15.407 (a) (2)	789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
Power reduction (Antenna Gain > 6 dBi)	FCC	15.407 (a) (2)	-	☐ Pass ☒ N/A
Band Edge and Radiated Spurious Emissions	FCC	15.407(b)(2), 15.407(b)(6)	ANSI C63.4 – 2014 789033 D02 General UNII Test Procedures New Rules v01	☒ Pass* ☐ N/A
Power Spectral Density	FCC	15.407 (a) (2)	789033 D02 General UNII Test Procedures New Rules v01	☒ Pass ☐ N/A
Frequency Stability	FCC	15.407 (g)	-	☐ Pass ☒ N/A
Transmit Power Control (TPC)	FCC	15.407 (h)(1)	-	☐ Pass ☒ N/A
User Manual	FCC	-	-	☒ Pass ☐ 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. 3. Pass*: Please refer to report FCC_SL17072501-RUC-022A3_W5356.			

9 Measurement Uncertainty

9.1 Conducted Emissions

The test is to measure the conducted emissions to the mains port of the EUT.
Some error sources that can contribute to the total uncertainty:

- Uncertainty of the receiver
- Uncertainty of the LISN
- Uncertainty of cables
- Uncertainty due to the mismatches
- Etc, see the below table for details

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
LISN Insertion Loss	0.40	Normal	2	1	0.20
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 LISN - Receiver	0.25	U-Shape	1.414	1	0.1768033
LISN Impedance	2.5	Triangular	2.449	1	1.0208248
Combined Standard Uncertainty					1.928133
Expanded Uncertainty (K=2)					3.856266

The total derived measurement uncertainty is +/- 3.86 dB.

9.2 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
Expanded Uncertainty (K=2)					6.0118262

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

9.3 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
Expanded Uncertainty (K=2)					8.4726

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

9.4 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

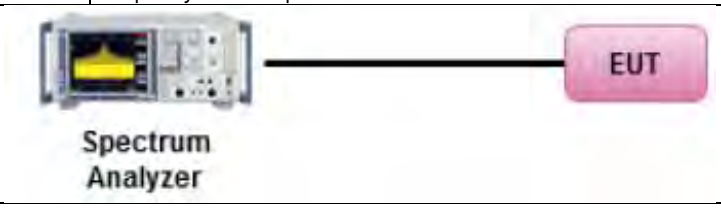
Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Reference Level	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Attenuator	0.25	Normal	2	1	0.125
Mismatch	0.25	U-Shape	1.414	1	0.1768033
Combined Standard Uncertainty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

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

10 Measurements, Examination and Derived Results

10.1 Output Power

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407	a)(2)	For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm 10 log B, where B is the 26 dB emission bandwidth in megahertz.	☒
	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.	☒
Test Setup			
Test Procedure	789033 D02 General UNII Test Procedures New Rules v01r02 Measurement using a Spectrum Analyzer or EMI Receiver (SA) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep): - Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal. - Set RBW = 1 MHz - Set VBW = 3 MHz - Number of points in sweep ≥ 2 × span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.) - Sweep time = auto. - Detector = power averaging (rms), if available. Otherwise, use sample detector mode. - If transmit duty cycle < 98%, 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 ≥ 98%, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run." - Trace average at least 100 traces in power averaging (rms) mode. - 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.		
Test Date	10/24/2017 – 02/08/2018	Environmental condition	Temperature 23ºC Relative Humidity 44% Atmospheric Pressure 1021mbar
Remark	N/A		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Chen Ge at RF test site.

Output Power measurement result for 5.3GHz

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
Output Power	802.11a	5260	Low	20.008	19.612	22.825	24	Pass
	802.11a	5280	Mid	19.719	19.647	22.694	24	Pass
	802.11a	5320	High	18.453	18.417	21.445	24	Pass
	802.11n-20M	5260	Low	20.155	20.078	23.127	24	Pass
	802.11n-20M	5280	Mid	20.083	19.572	22.845	24	Pass
	802.11n-20M	5320	High	18.448	18.520	21.494	24	Pass
	802.11n-40M	5270	Low	20.535	20.867	23.714	24	Pass
	802.11n-40M	5310	Mid	18.277	18.257	21.277	24	Pass
	802.11ac-80M	5290	High	17.593	17.742	20.678	24	Pass

Output Power measurement result for 5.5GHz

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
Output Power	802.11a	5500	Low	19.357	19.194	22.286	24	Pass
	802.11a	5580	Mid	20.043	19.711	22.890	24	Pass
	802.11a	5700	High	19.368	19.713	22.554	24	Pass
	802.11n-20M	5500	Low	19.198	19.538	22.382	24	Pass
	802.11n-20M	5580	Mid	20.108	19.708	22.923	24	Pass
	802.11n-20M	5700	High	19.752	19.831	22.802	24	Pass
	802.11n-40M	5510	Low	18.079	18.052	21.076	24	Pass
	802.11n-40M	5550	Mid	20.594	21.278	23.960	24	Pass
	802.11n-40M	5670	High	20.345	20.077	23.223	24	Pass
	802.11ac-80M	5530	Low	16.557	16.847	19.715	24	Pass
	802.11ac-80M	5610	High	19.318	20.271	22.831	24	Pass

Note: Two chains are cross-polarized, additional gain is 10 log10(NANT)=0dB, max directional gain of the EUT is 5dBi. No limit adjustment is needed. All the mode transmission is MIMO.

Output Power measurement result for CROSS channels (in band 5470-5725MHz)

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
	802.11a	5720	CROSS	19.58	19.47	22.54	24	Pass
	802.11n-20M	5720	CROSS	19.34	19.29	22.33	24	Pass
	802.11n-40M	5710	CROSS	19.74	19.76	22.76	24	Pass
	802.11ac-80M	5690	CROSS	20.14	20.42	23.29	24	Pass

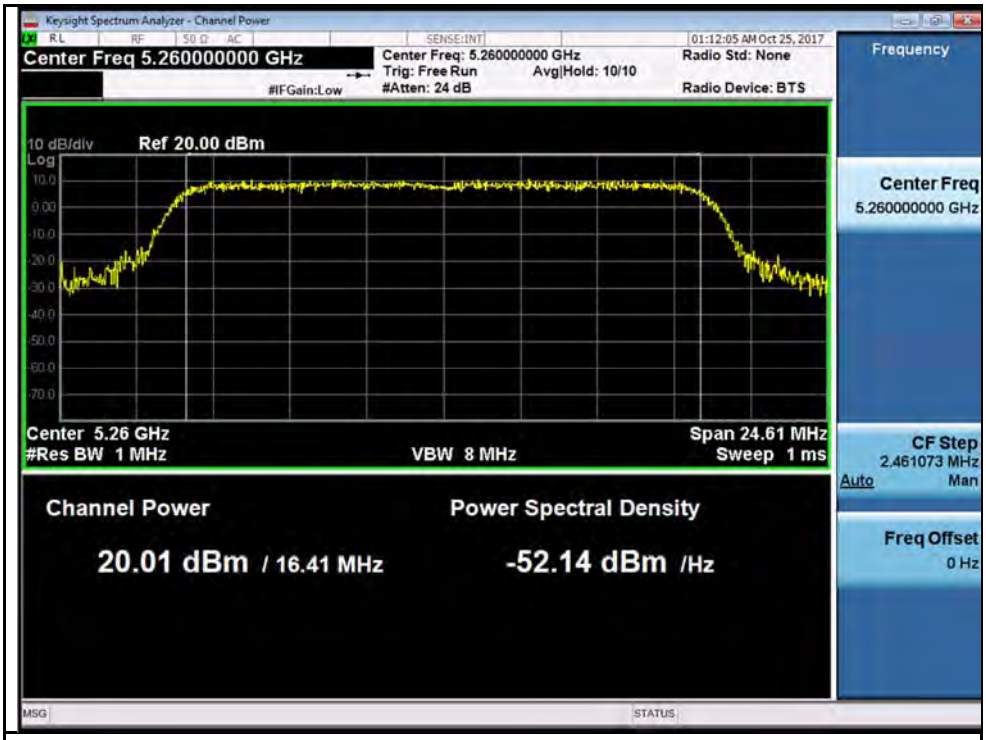
Output Power measurement result for CROSS channels (in band 5725-5850MHz)

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
Output Power	802.11a	5720	CROSS	19.58	19.47	22.54	30	Pass
	802.11n-20M	5720	CROSS	19.34	19.29	22.33	30	Pass
	802.11n-40M	5710	CROSS	19.74	19.76	22.76	30	Pass
	802.11ac-80M	5690	CROSS	20.14	20.42	23.29	30	Pass

Note: Two chains are cross-polarized, additional gain is 10 log10(NANT)=0dB, max directional gain of the EUT is 5dBi. No limit adjustment is needed. All the mode transmission is MIMO

Test Plot for W53:

Chain 0:



802.11a-5260M

802.11a-5280M

802.11a-5320M

802.11n-HT20 5260M

802.11n-HT20 5280M

802.11n-HT20 5320M

802.11n-HT40 5270M

802.11n-HT40 5310M

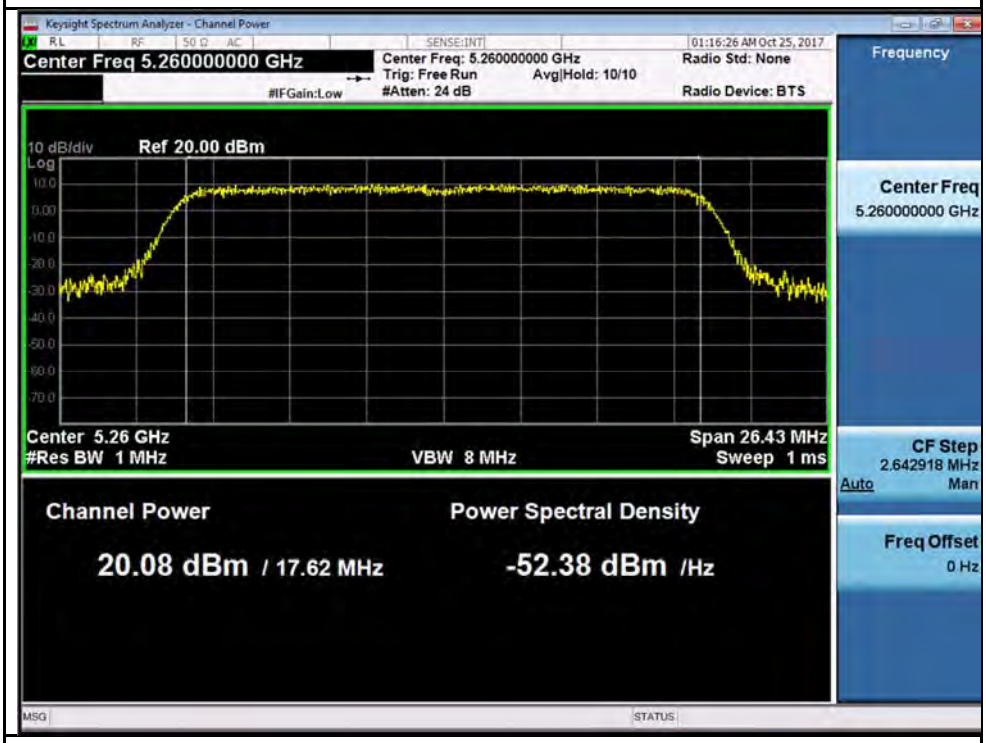
802.11ac-VHT80 5290M

Chain 1:

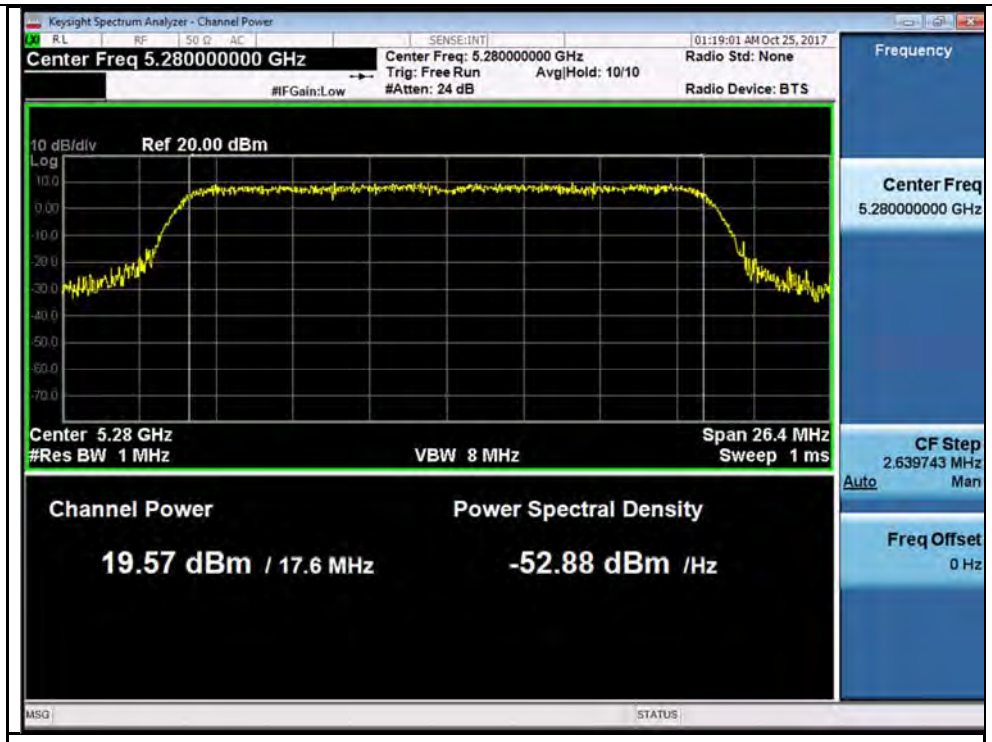
802.11a-5260M

802.11a-5280M

802.11a-5320M

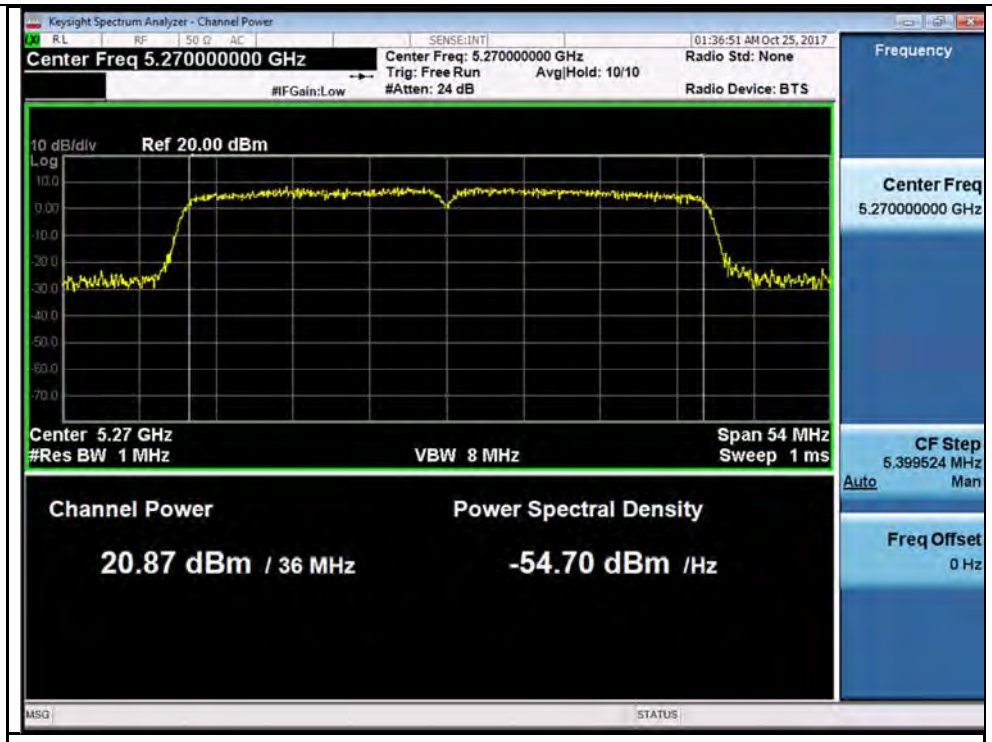


802.11n-HT20 5260M



802.11n-HT20 5280M

802.11n-HT20 5320M



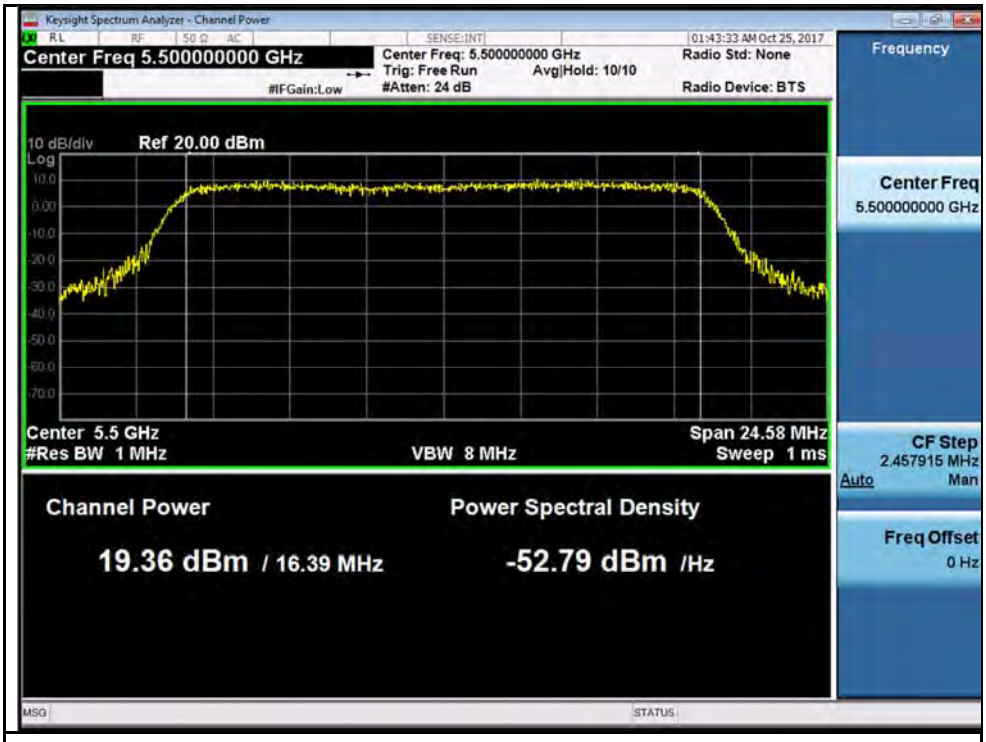
802.11n-HT40 5270M

802.11n-HT40 5310M

802.11ac-VHT80 5290M

Test Plot for W56:

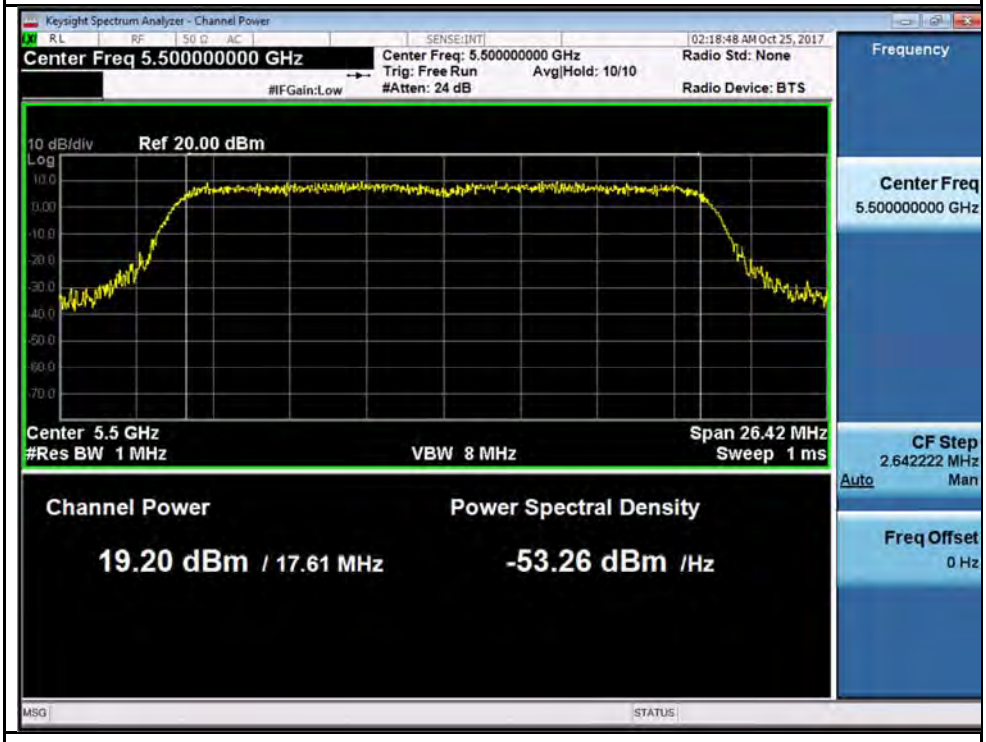
Chain 0:



802.11a-5500M

802.11a-5580M

802.11a-5700M



802.11n-HT20 5500M

802.11n-HT20 5580M

802.11n-HT20 5700M

802.11n-HT40 5510M

802.11n-HT40 5550M

802.11n-HT40 5670M

802.11ac-VHT80 5530M

802.11ac-VHT80 5610M

Chain 1:

802.11a-5500M

802.11a-5580M

802.11a-5700M

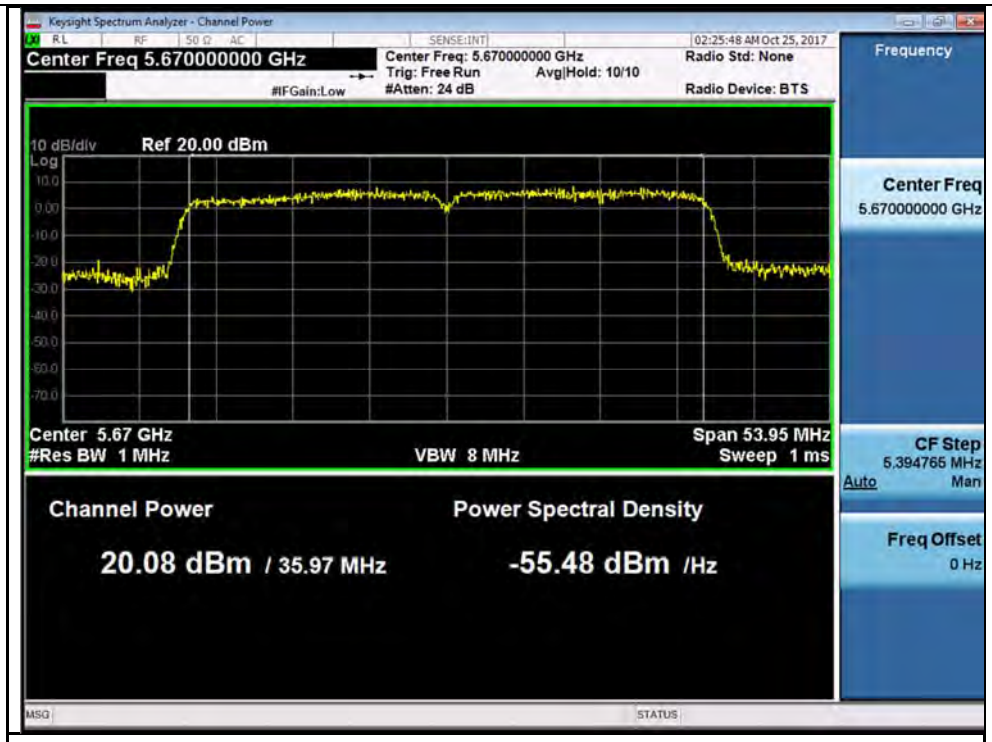
802.11n-HT20 5500M

802.11n-HT20 5580M

802.11n-HT20 5700M

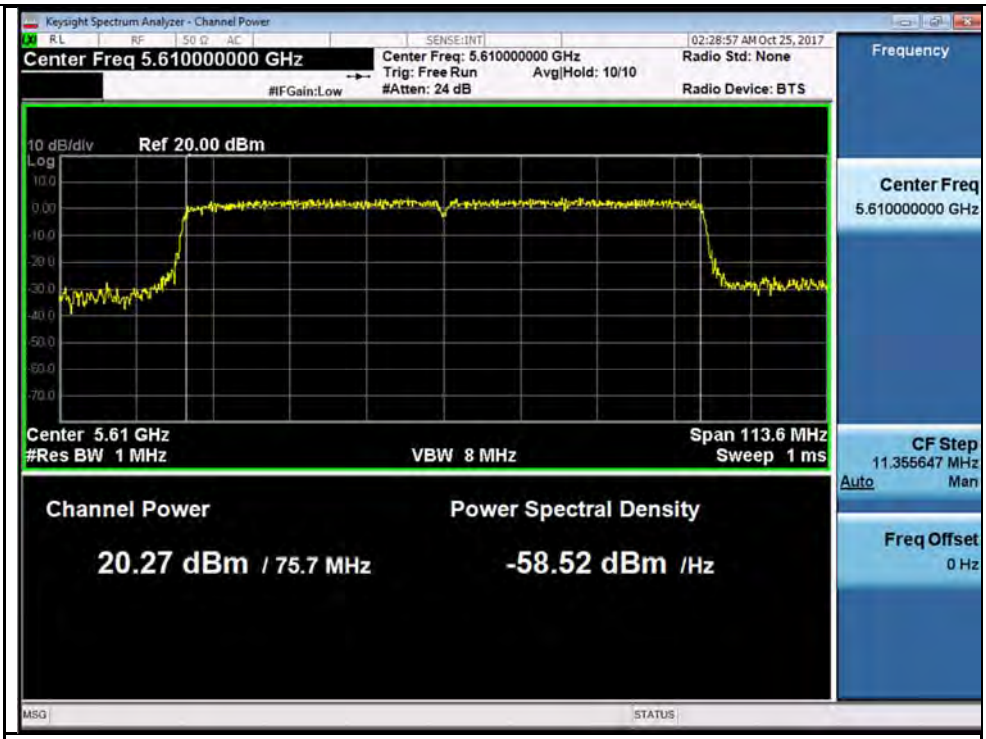
802.11n-HT40 5510M

802.11n-HT40 5550M



802.11n-HT40 5670M

802.11ac-VHT80 5530M



802.11ac-VHT80 5610M

Test Plot for Crossband:

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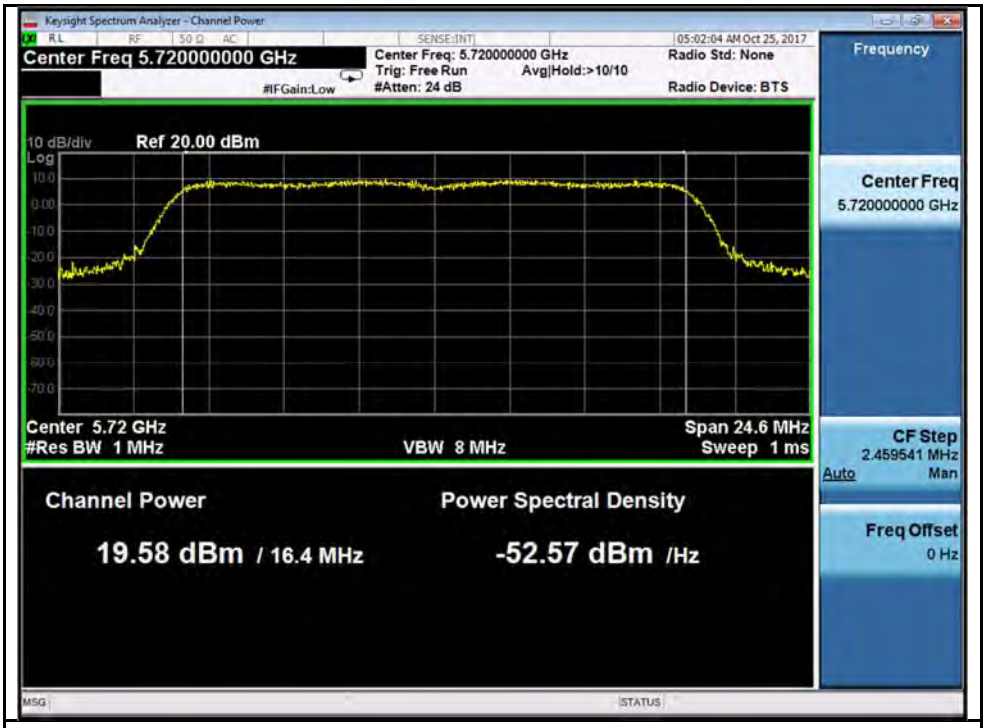
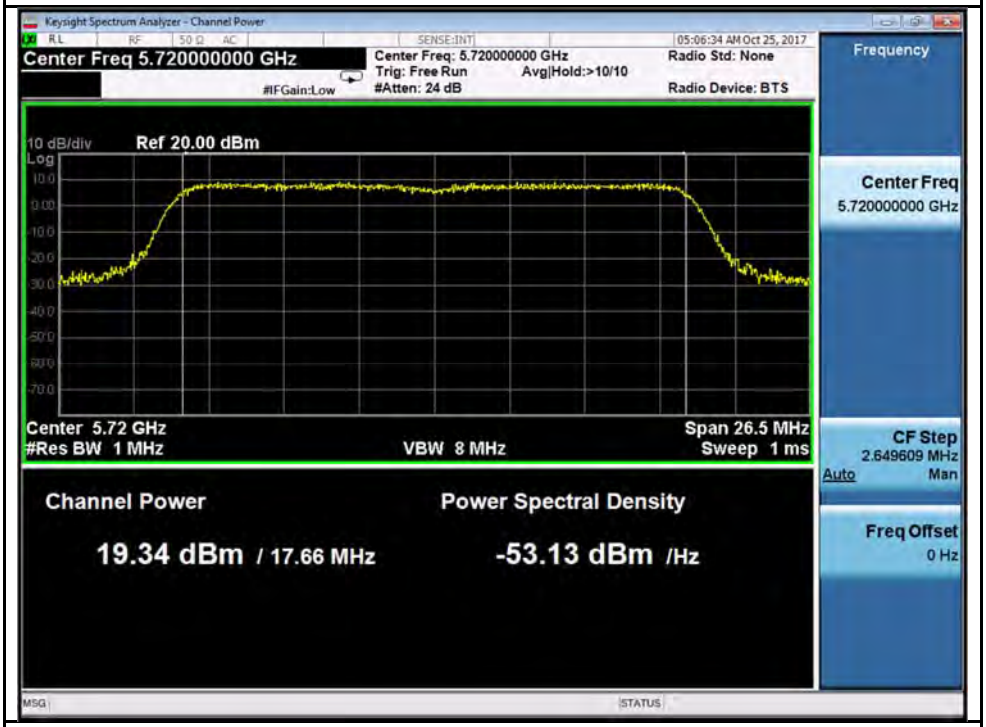
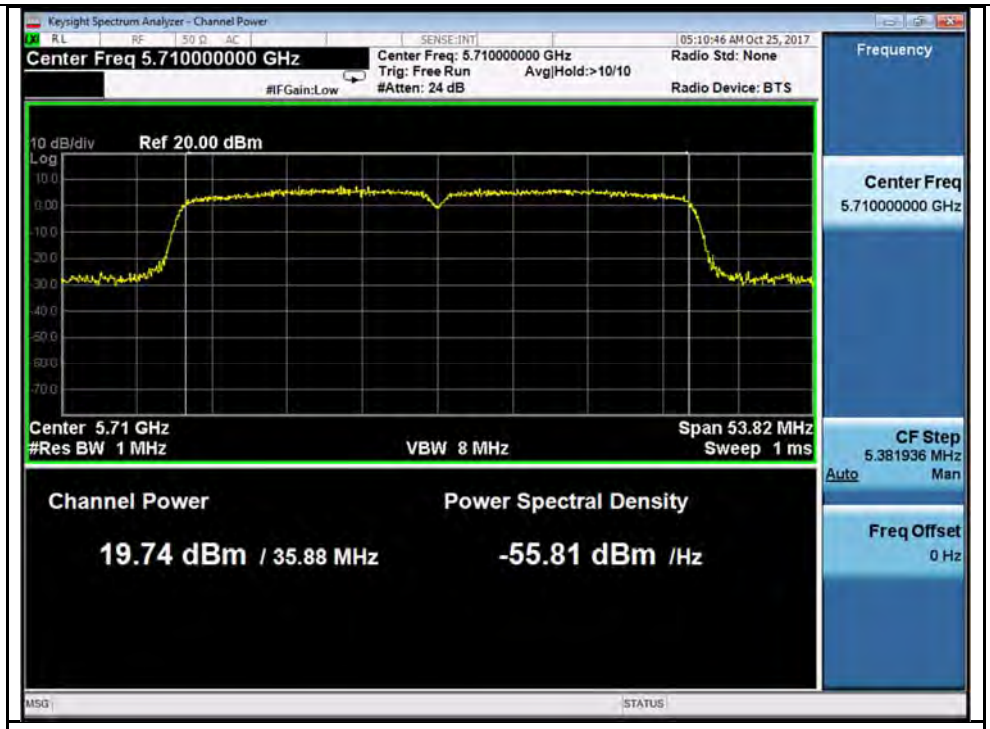


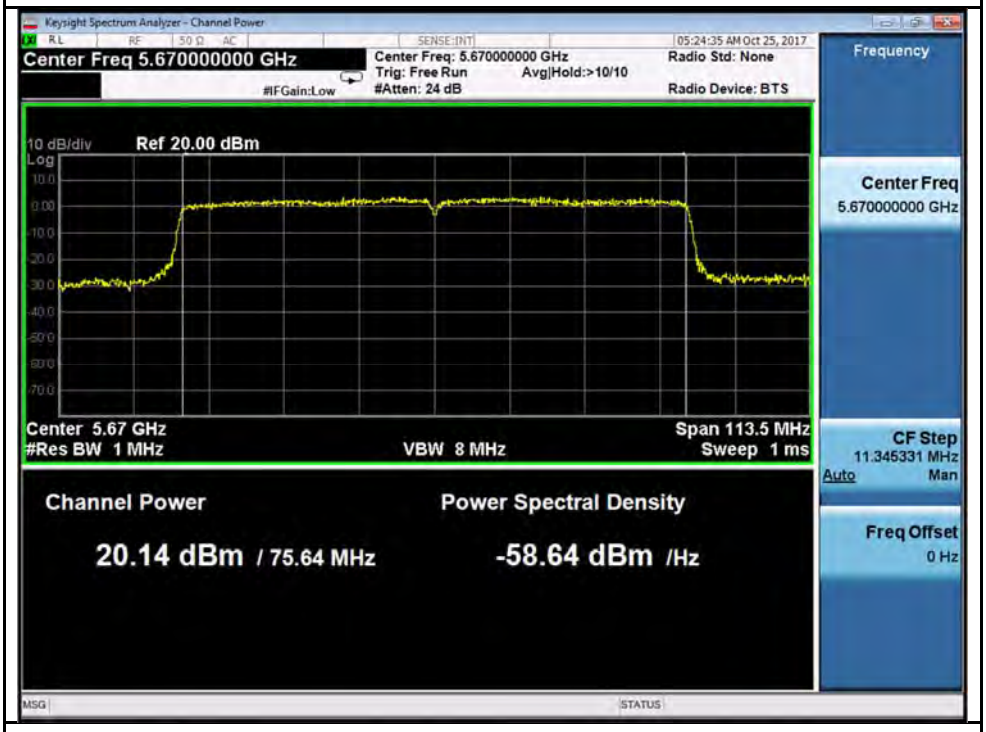
802.11a-5720M



802.11n-HT20 5720M

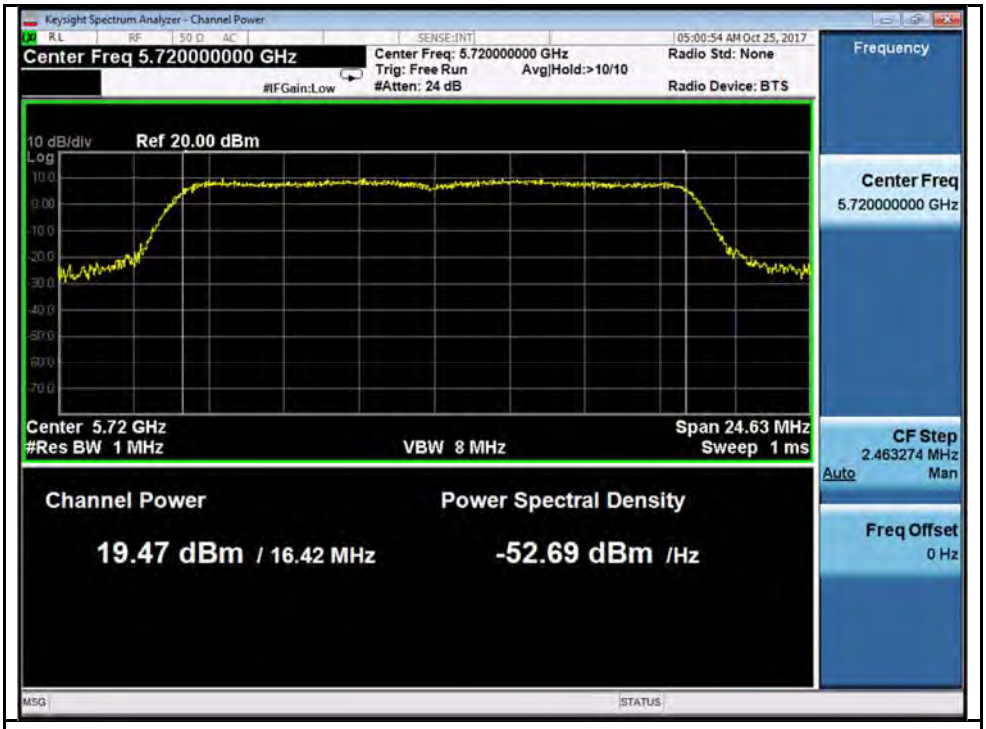


802.11n-HT40 5710M



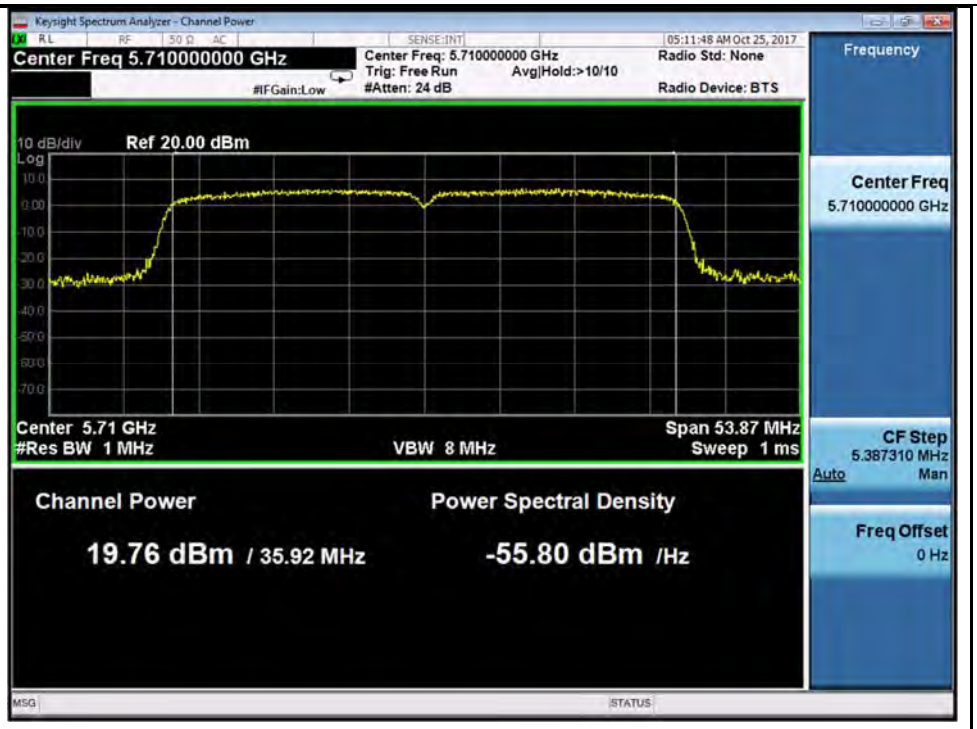
802.11ac-VHT80 5690M

Chain 1:

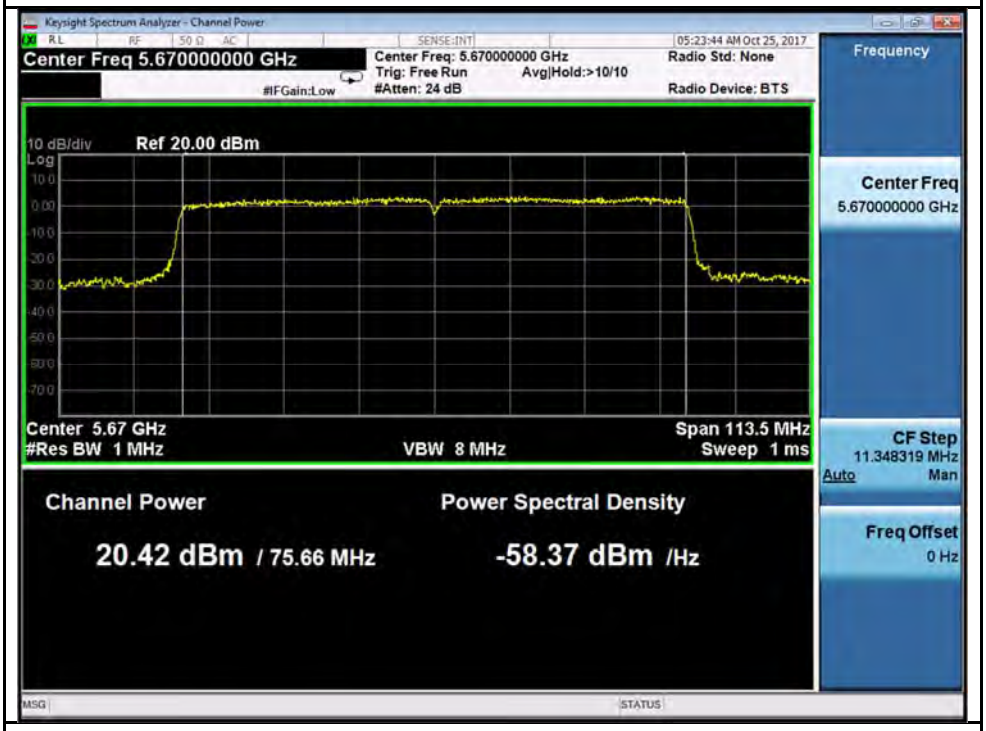


802.11a-5720M

802.11n-HT20 5720M



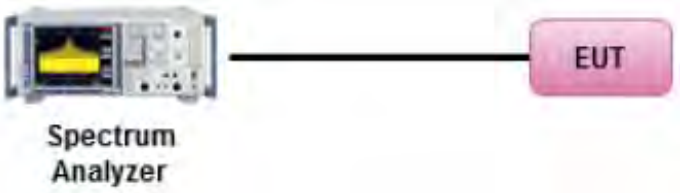
802.11n-HT40 5710M



802.11ac-VHT80 5690M

10.2 Peak Power Spectral Density

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407	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.	☐
	a)(1)(ii)	For an indoor 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.	☐
	a)(2)	For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.	☒
	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.	☒
Test Setup			
Test Procedure	789033 D02 General UNII Test Procedures New Rules v01, II.F. Method SA-1 Maximum spectral density measurement procedure - Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal. - Set RBW = 1 MHz - Set VBW ⩾ 3 MHz - Detector = RMS. - Sweep time = auto couple. - Trace mode = max hold. - Trace average at least 100 traces in power averaging - Use the peak marker function to determine the maximum amplitude level within the RBW. Apply correction to the result if different RBW is used.		
Test Date	10/24/2017	Environmental condition	Temperature 22ºC Relative Humidity 46% Atmospheric Pressure 1020mbar
Remark	N/A		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Chen Ge at RF test site.

PSD measurement result for 5.3GHz

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
PSD	802.11a	5260	Low	7.613	7.541	10.587	11	Pass
	802.11a	5280	Mid	7.960	7.850	10.916	11	Pass
	802.11a	5320	High	6.489	6.273	9.393	11	Pass
	802.11n-20M	5260	Low	7.668	7.678	10.683	11	Pass
	802.11n-20M	5280	Mid	7.596	7.675	10.646	11	Pass
	802.11n-20M	5320	High	6.354	6.299	9.337	11	Pass
	802.11n-40M	5270	Low	5.408	5.384	8.406	11	Pass
	802.11n-40M	5310	Mid	3.342	3.165	6.265	11	Pass
	802.11ac-80M	5290	High	-0.815	-0.724	2.241	11	Pass

PSD measurement result for 5.5GHz

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
PSD	802.11a	5500	Low	7.340	7.307	10.334	11	Pass
	802.11a	5580	Mid	7.784	7.837	10.821	11	Pass
	802.11a	5700	High	7.944	7.914	10.939	11	Pass
	802.11n-20M	5500	Low	7.236	7.229	10.243	11	Pass
	802.11n-20M	5580	Mid	7.598	7.648	10.633	11	Pass
	802.11n-20M	5700	High	7.313	7.423	10.379	11	Pass
	802.11n-40M	5510	Low	3.077	3.339	6.220	11	Pass
	802.11n-40M	5550	Mid	5.856	5.665	8.772	11	Pass
	802.11n-40M	5670	High	5.565	5.189	8.391	11	Pass
	802.11ac-80M	5530	Low	-1.949	-1.776	1.149	11	Pass
	802.11ac-80M	5610	High	0.855	1.123	4.001	11	Pass

Note: Two chains are cross-polarized, additional gain is 10 log10(NANT)=0dB, max directional gain of the EUT is 5dBi. No limit adjustment is needed. All the mode transmission is MIMO.

PSD measurement result for cross channels (in band 5470-5725MHz)

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Limit (dBm)	Result
				Chain0	Chain1	Combined Power		
PSD	802.11a	5720	CROSS	7.76	7.47	10.63	11	Pass
	802.11n-20M	5720	CROSS	6.59	6.62	9.62	11	Pass
	802.11n-40M	5710	CROSS	4.80	4.64	7.73	11	Pass
	802.11ac-80M	5690	CROSS	1.64	1.65	4.66	11	Pass

PSD measurement result for cross channels (in band 5725-5850MHz)

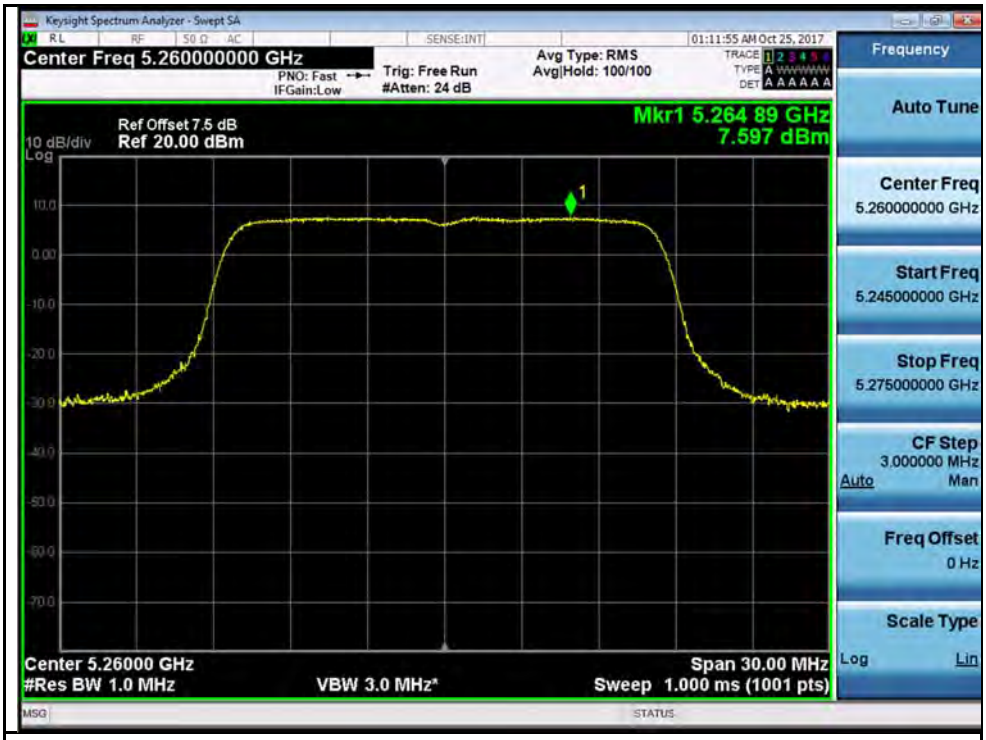
Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Corrected Level (dBm/500kHz)	Limit (dBm/500kkHz)	Result
			Chain0	Chain1	Combined PSD			
802.11a	5720	CROSS	-0.36	-0.67	2.50	9.49	30	Pass
802.11n-20M	5720	CROSS	-0.41	-0.80	2.41	9.40	30	Pass
802.11n-40M	5710	CROSS	-3.25	-3.47	-0.35	6.64	30	Pass
802.11ac-80M	5690	CROSS	-6.49	-6.52	-3.49	3.50	30	Pass

Correction factor=10*log(500/100)=6.99

Note: Two chains are cross-polarized, additional gain is 10 log10(NANT)=0dB, max directional gain of the EUT is 5dBi. No limit adjustment is needed. All the mode transmission is MIMO.

Test Plot for W53:

Chain 0:

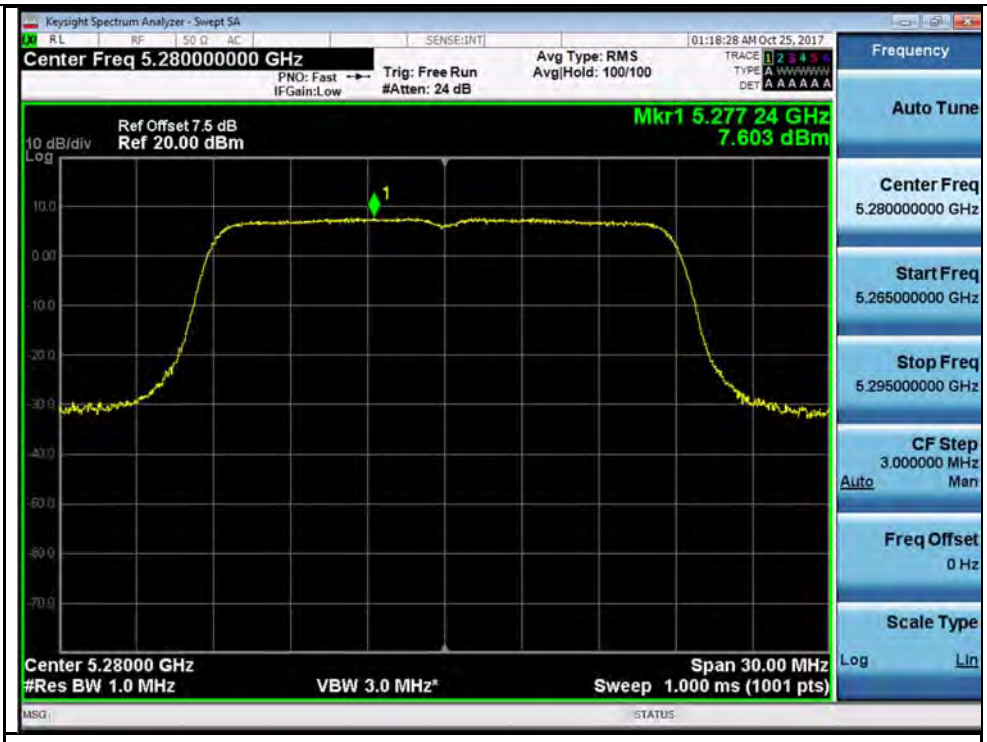


802.11a-5260M

802.11a-5280M

802.11a-5320M

802.11n-HT20 5260M

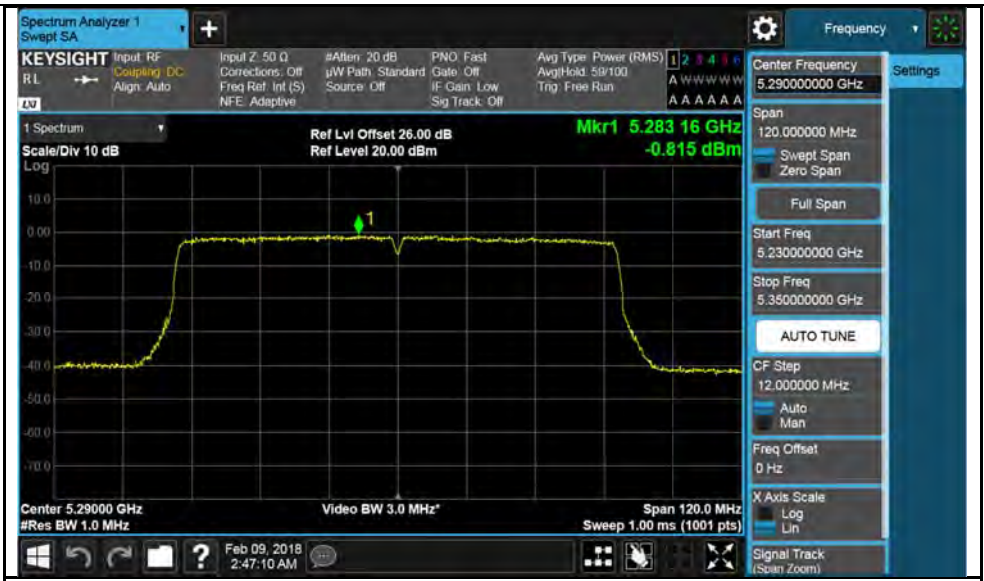


802.11n-HT20 5280M

802.11n-HT20 5320M

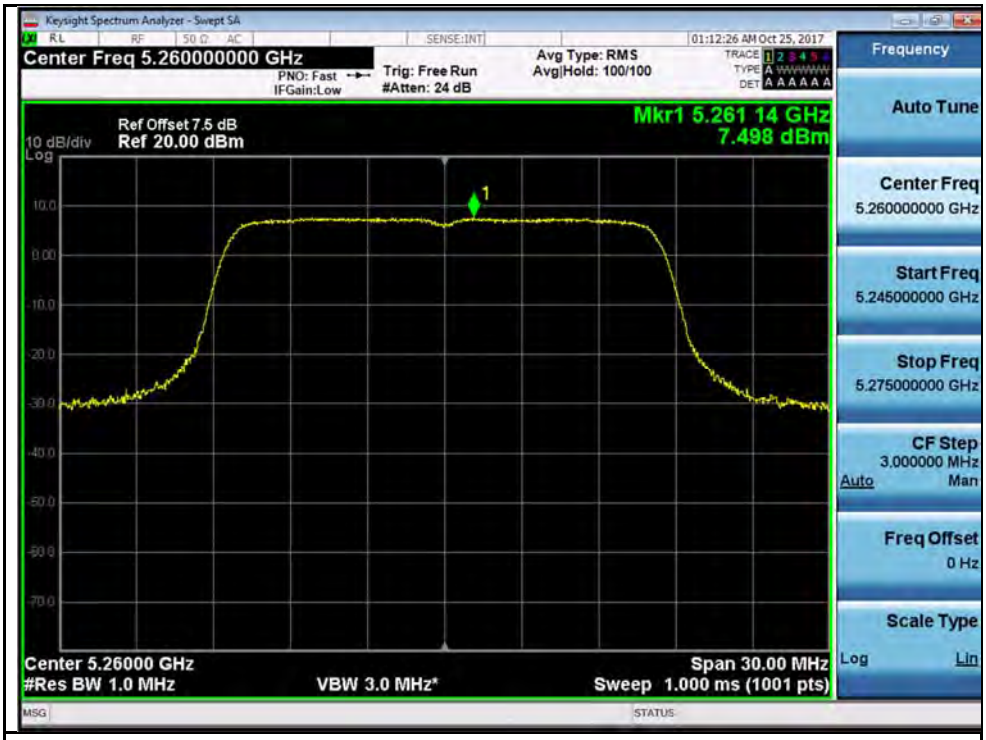
802.11n-HT40 5270M

802.11n-HT40 5310M



802.11ac-VHT80 5290M

Chain 1:

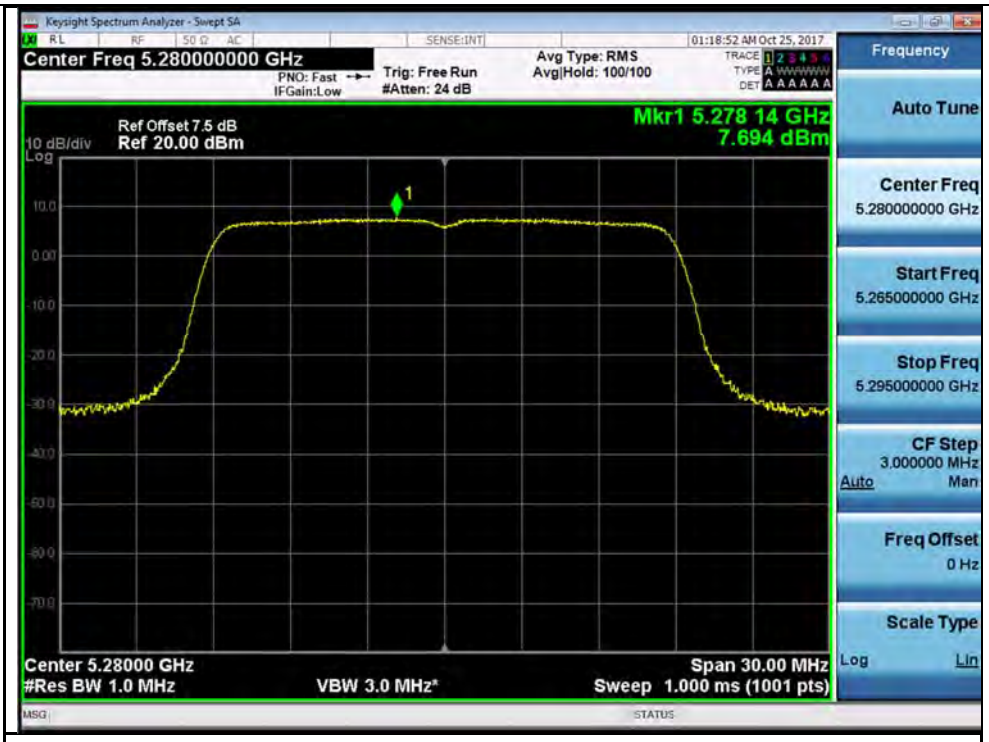


802.11a-5260M

802.11a-5280M

802.11a-5320M

802.11n-HT20 5260M



802.11n-HT20 5280M

802.11n-HT20 5320M

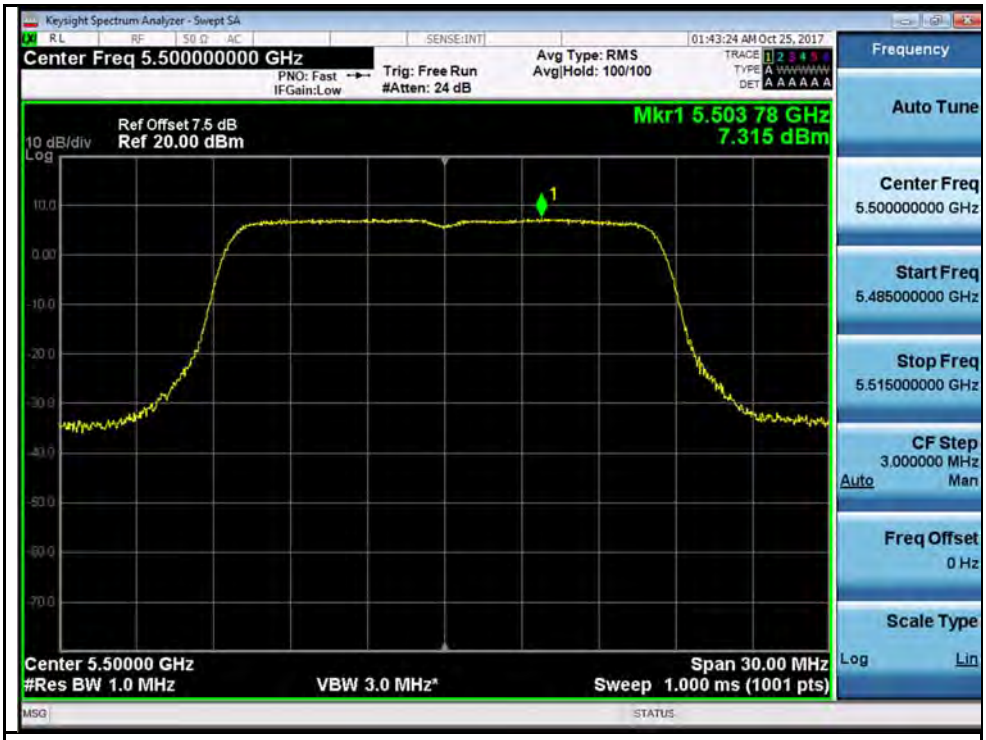
802.11n-HT40 5270M

802.11n-HT40 5310M

802.11ac-VHT80 5290M

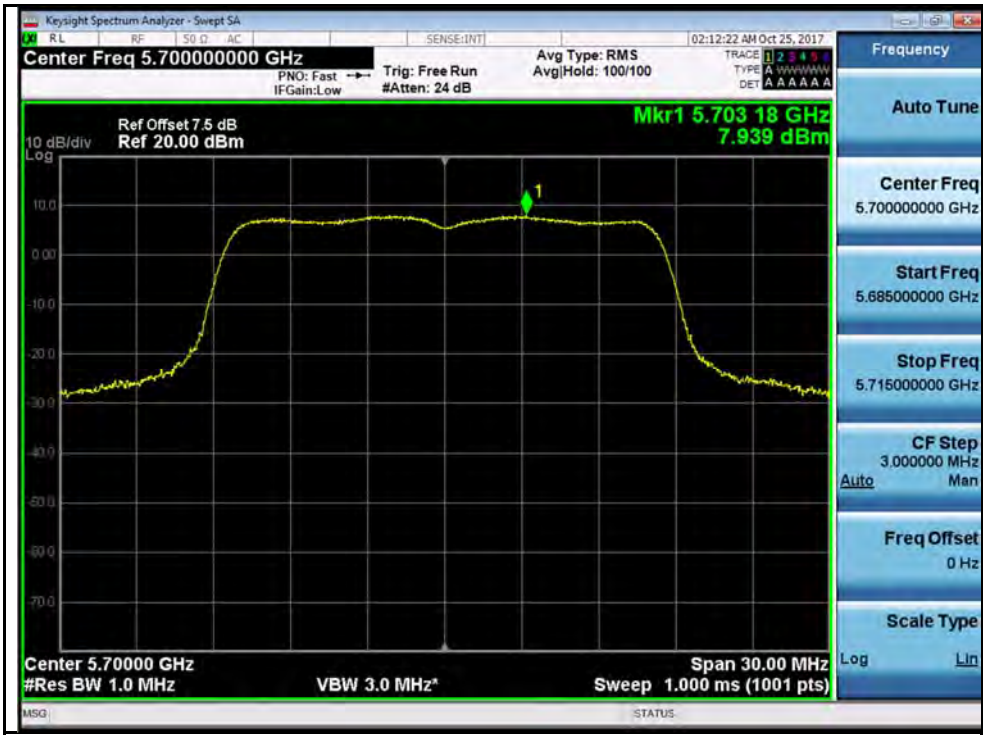
Test Plot for W56:

Chain 0:



802.11a-5500M

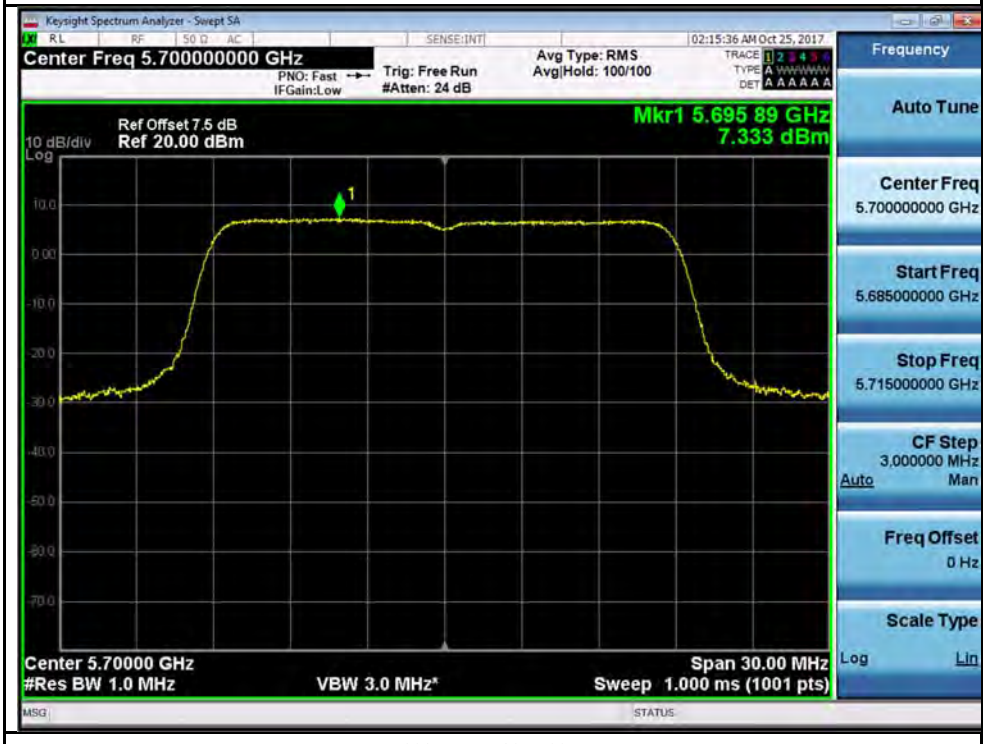
802.11a-5580M



802.11a-5700M

802.11n-HT20 5500M

802.11n-HT20 5580M



802.11n-HT20 5700M

802.11n-HT40 5510M

802.11n-HT40 5550M

802.11n-HT40 5670M

802.11ac-VHT80 5530M

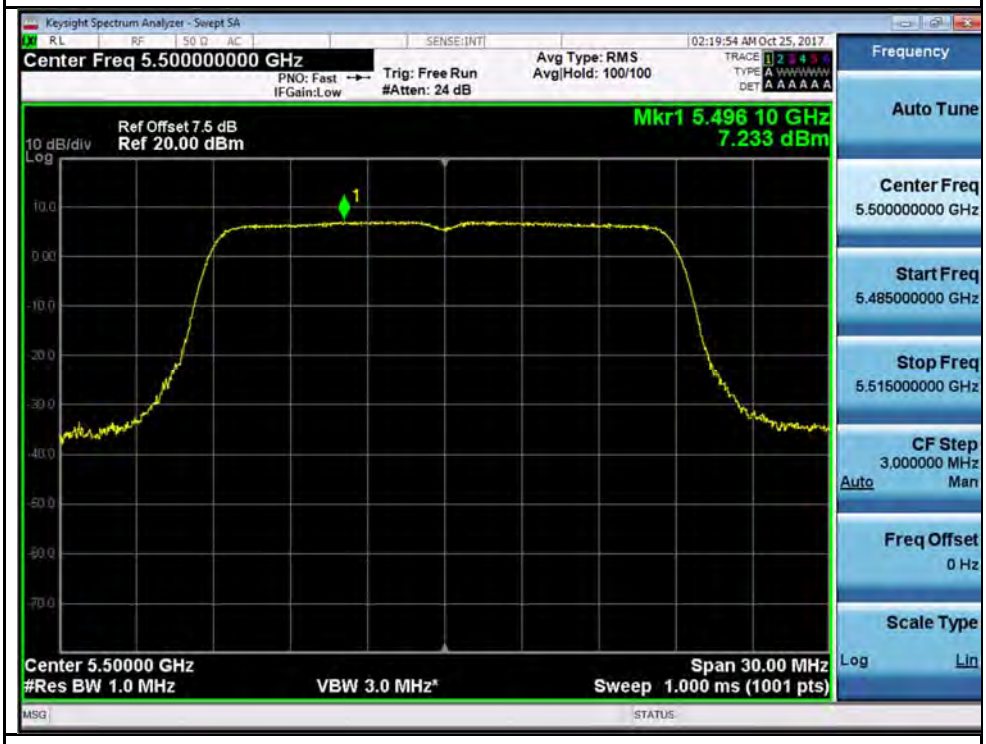
802.11ac-VHT80 5610M

Chain 1:

802.11a-5500M

802.11a-5580M

802.11a-5700M



802.11n-HT20 5500M

802.11n-HT20 5580M

802.11n-HT20 5700M

802.11n-HT40 5510M

802.11n-HT40 5550M

802.11n-HT40 5670M

802.11ac-VHT80 5530M

802.11ac-VHT80 5610M

Test Plot for Crossband (W56 procedure):

Chain 0:

802.11a-5720M

802.11n-HT20 5720M

802.11n-HT40 5710M

802.11ac-VHT80 5690M

Chain 1:

802.11a-5720M

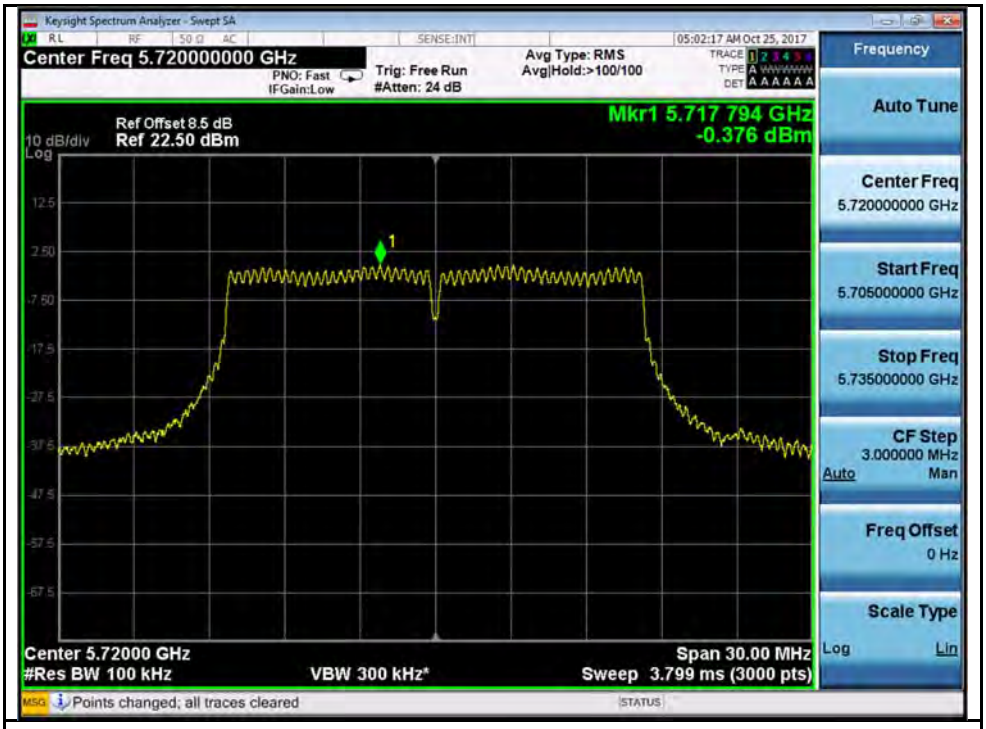
802.11n-HT20 5720M

802.11n-HT40 5710M

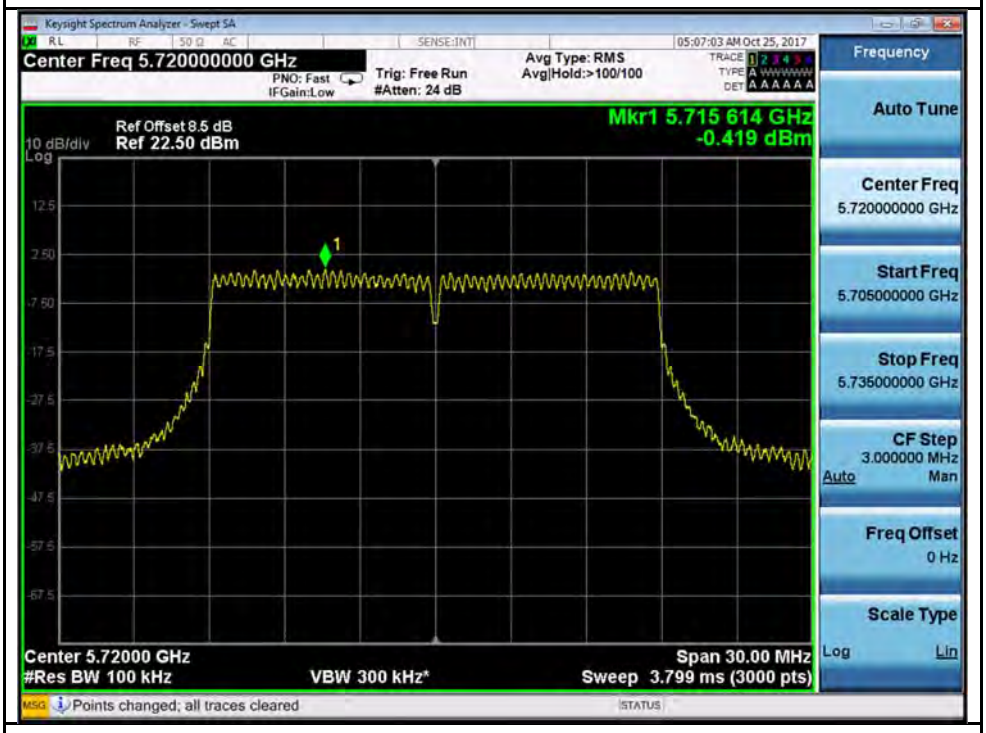
802.11ac-VHT80 5690M

Test Plot for Crossband (W58 procedure):

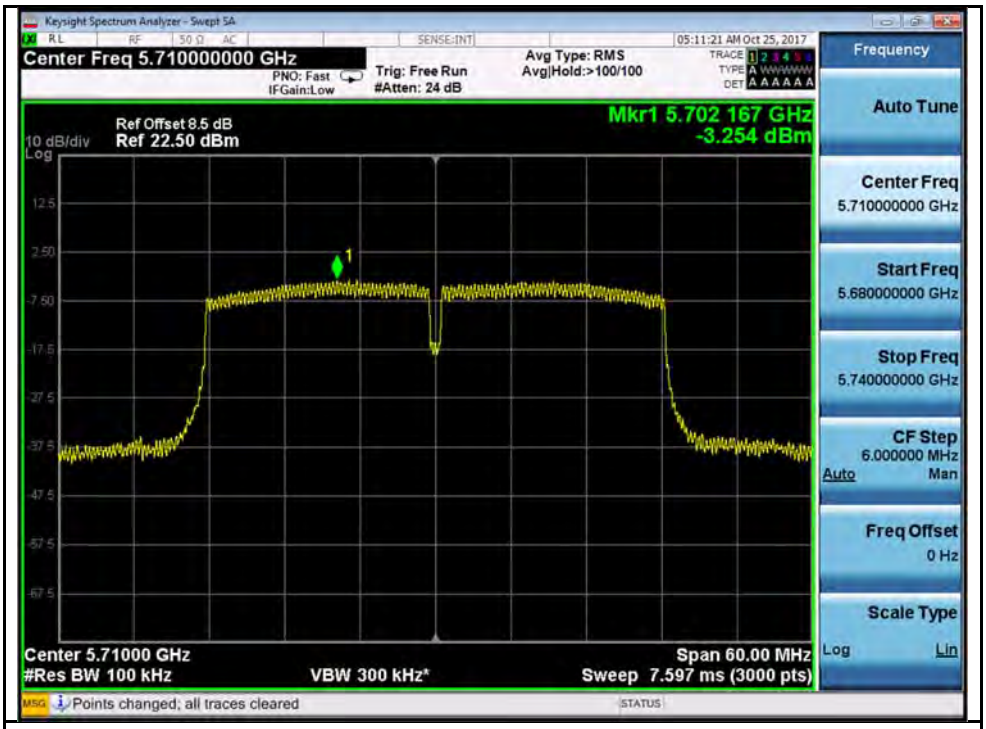
Chain 0:



802.11a-5720M



802.11n-HT20 5720M



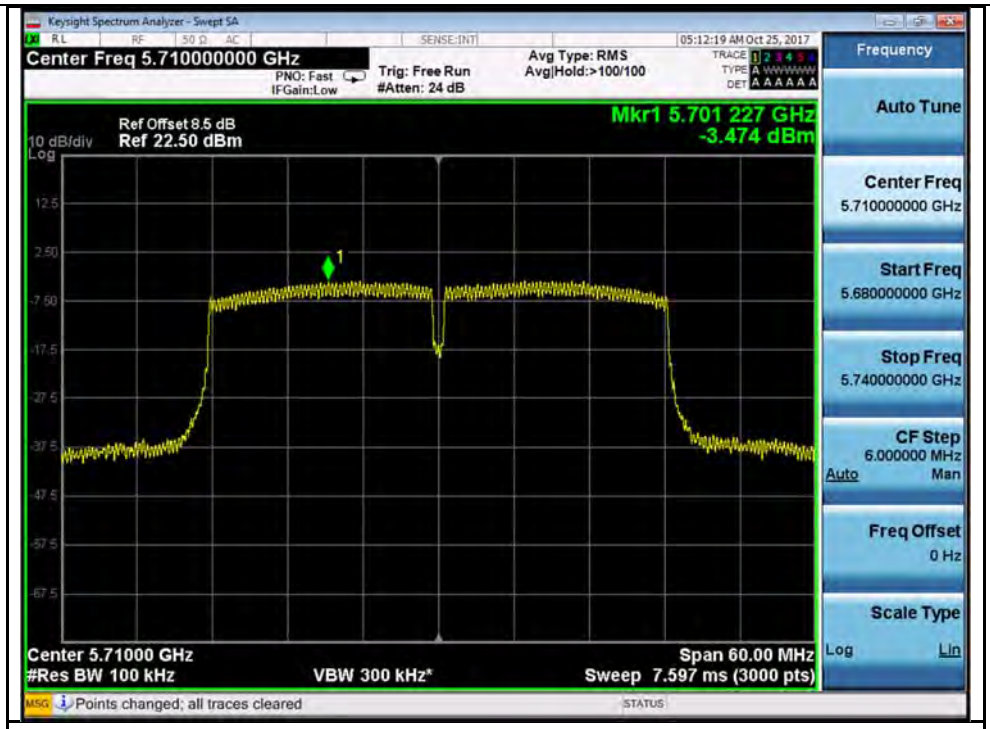
802.11n-HT40 5710M

802.11ac-VHT80 5690M

Chain 1:

802.11a-5720M

802.11n-HT20 5720M



802.11n-HT40 5710M

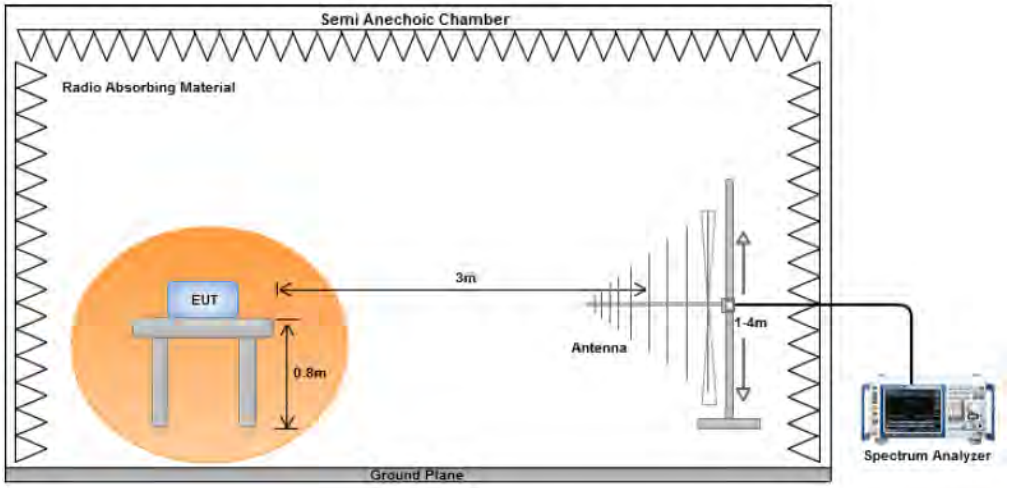
802.11ac-VHT80 5690M

10.3 Radiated Spurious Emissions below 1GHz

Requirement(s):

Spec	Requirement	Applicable
47CFR§ 15.407(b) 15.209 (a)	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	☒

Frequency range (MHz)	Field Strength (uV/m)
30 – 88	100
88 – 216	150
216 960	200
Above 960	500

Test Setup	
Procedure	1. The EUT was switched on and allowed to warm up to its normal operating condition. 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: a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. A Quasi-peak measurement was then made for that frequency point. 4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.
Remark	The EUT was scanned up to 1GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.
Result	☒ Pass ☐ Fail

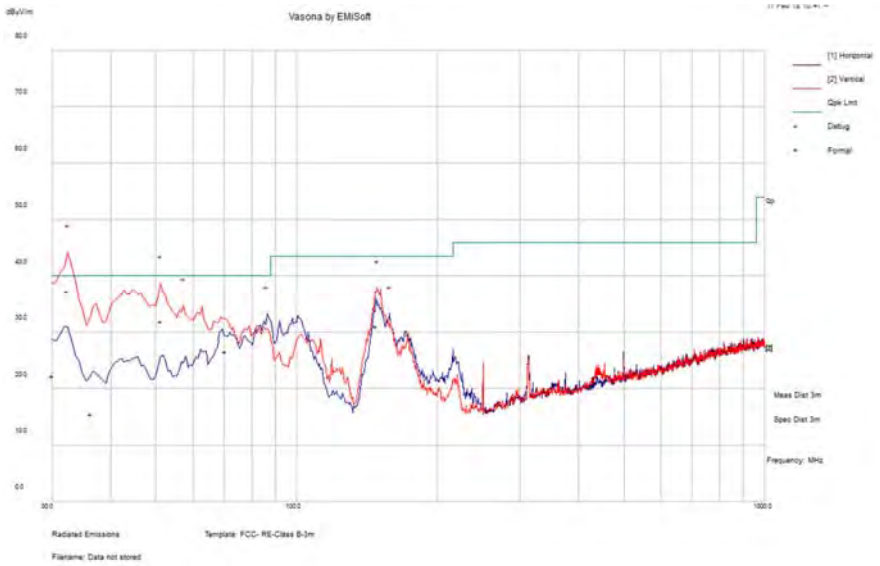
Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Shuo Zhang at 10m chamber.

Radiated Emission Test Results (Below 1GHz)

Test specification	below 1GHz			
Environmental Conditions:	Temp (°C):	23	Result	Pass
	Humidity (%)	46		
	Atmospheric (mbar):	1017		
Mains Power:	120VAC, 60Hz			
Tested by:	Gary Chou			
Test Date:	10/24/2017-02/08/2018			
Remarks:	802.11a – 5320MHz			

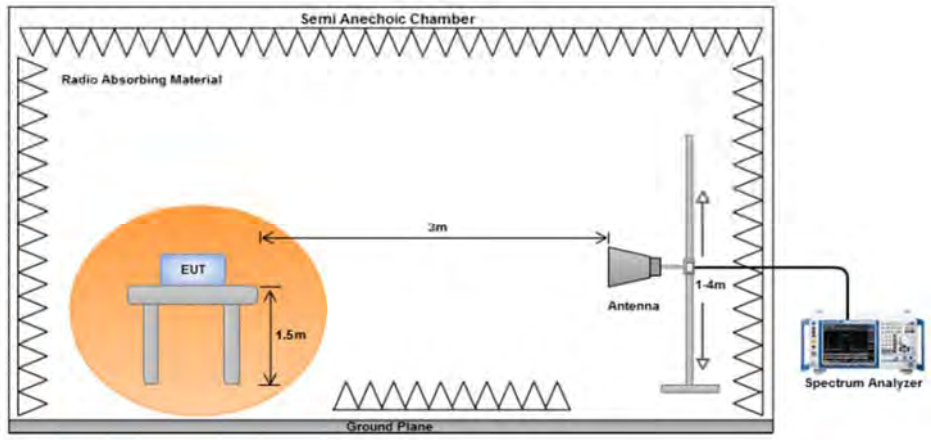


Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
32.33	40.96	11.33	-15.07	37.22	Quasi Max	V	108	17	40	-2.79	Pass
51.12	47.63	11.59	-27.3	31.91	Quasi Max	V	143	212	40	-8.09	Pass
30.00	23.84	11.29	-12.86	22.27	Quasi Max	H	340	303	40	-17.73	Pass
147.36	42.25	12.38	-23.64	30.99	Quasi Max	V	119	185	43.5	-12.51	Pass
70.25	42.43	11.7	-27.57	26.56	Quasi Max	V	117	185	40	-13.44	Pass
36.22	22.4	11.39	-18.37	15.42	Quasi Max	H	259	280	40	-24.58	Pass

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

10.4 Radiated Spurious Emissions above 1GHz

Requirement(s):

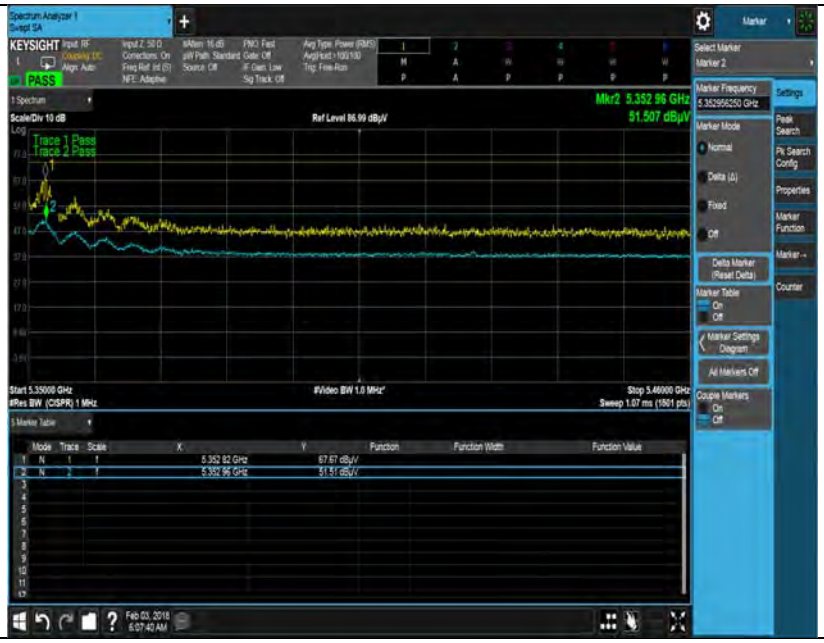
Spec	Item	Requirement	Applicable
47CFR§ 15.209	1	Restricted band, emission must also comply with the radiated emission limits specified in 15.209	☒
Test Setup			
Procedure	1. The EUT was switched on and allowed to warm up to its normal operating condition. 2. The test was carried out at the selected 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: a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. An average measurement was then made for that frequency point. 4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.	
Remark	N/A		
Result	☒ Pass ☐ Fail		

Test Data ☐ Yes (See below) ☒ N/A

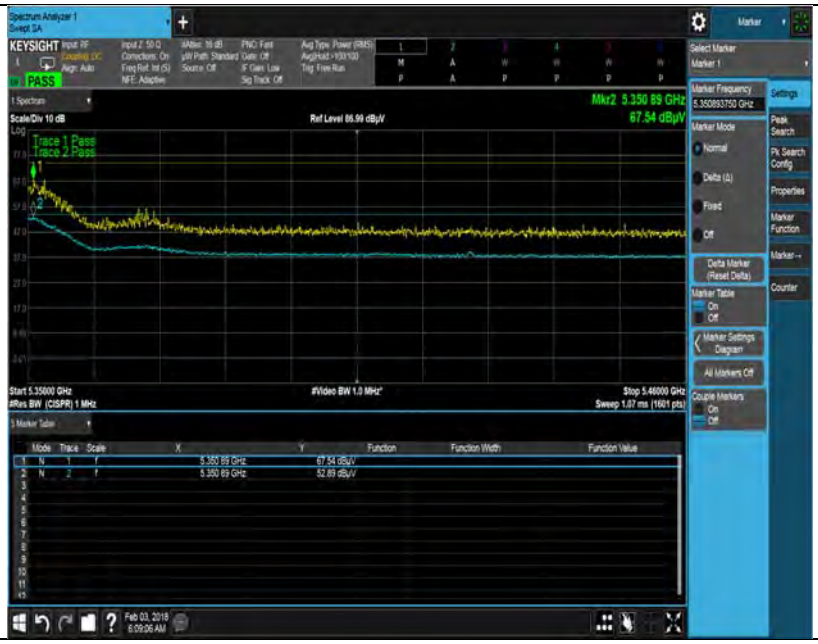
Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Chen Ge at 10m chamber.

Radiated Restricted band Plots:

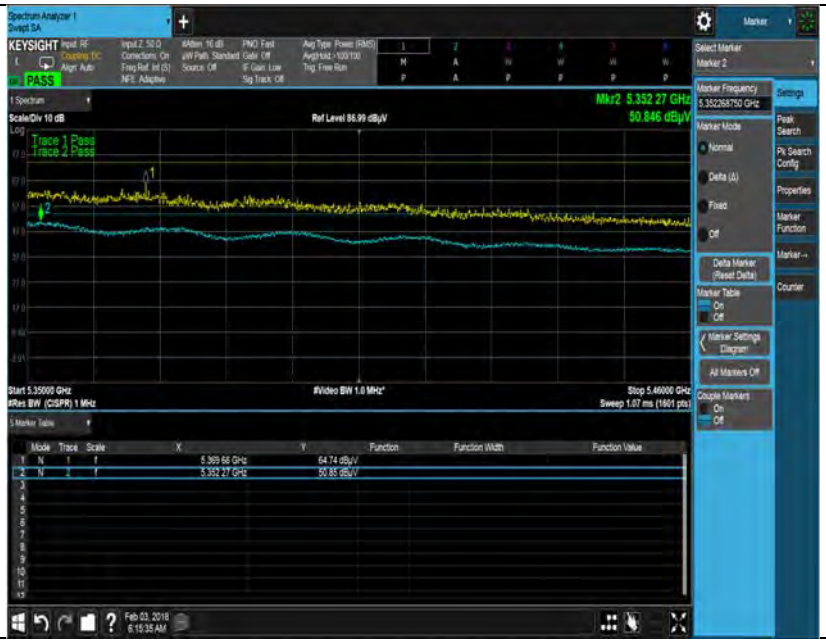


802.11a 5320M(5350-5460MHz)

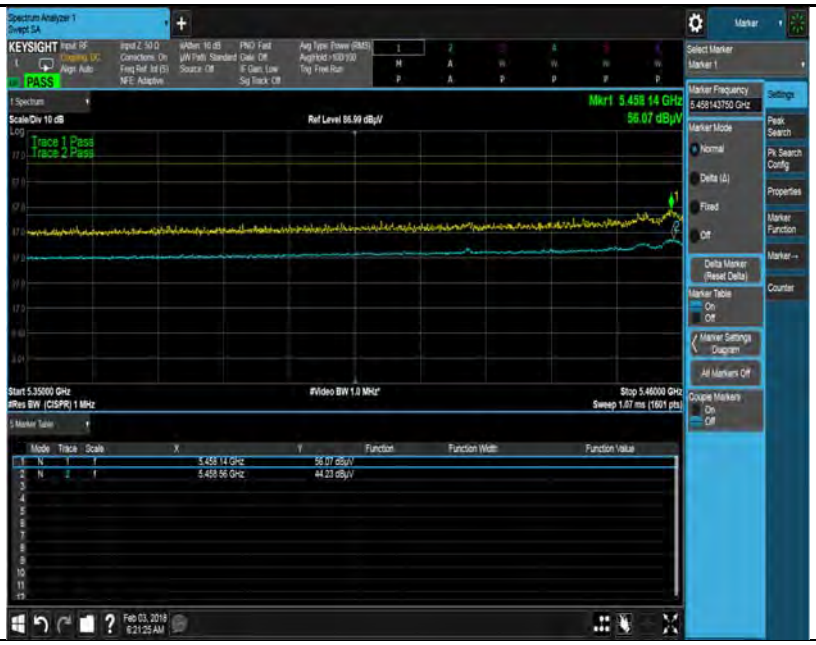


802.11n-HT20 5320M(5350-5460MHz)

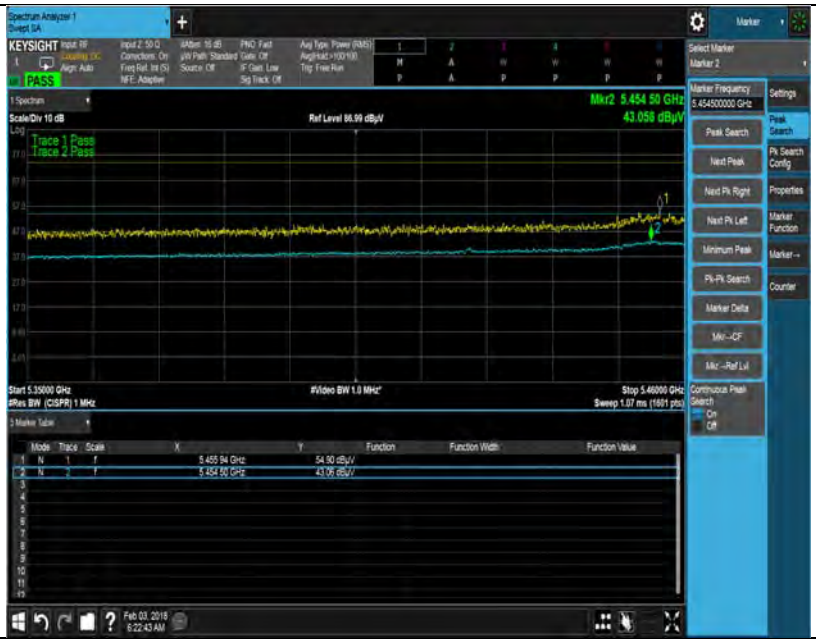
802.11n-HT40 5310M(5350-5460MHz)



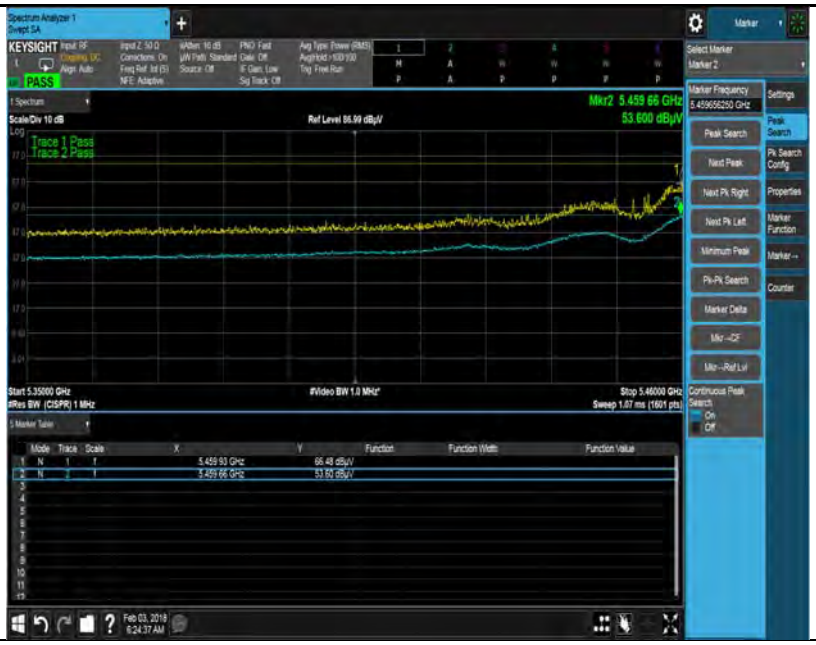
802.11ac 5290M(5350-5460MHz)



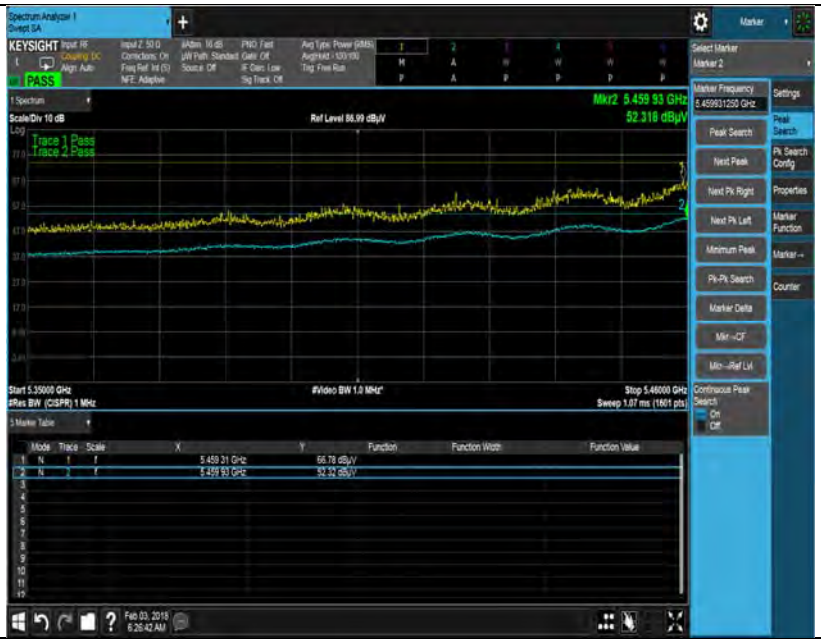
802.11a 5500M(5350-5460MHz)



802.11n-HT20 5500M(5350-5460MHz)



802.11n-HT40 5510M(5350-5460MHz)



802.11ac 5530M(5350-5460MHz)

Radiated Emission Test Results (Above 1GHz)

W53 band:

Above 1GHz-40GHz – 802.11a – 5260MHz

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
7905.51	41.05	5.35	-0.33	46.07	Peak Max	H	266	300	74	-27.93	Pass
10520.91	44.96	6.09	1.89	52.94	Peak Max	H	232	47	74	-21.06	Pass
13721.76	45.84	7.11	4.58	57.53	Peak Max	V	169	160	74	-16.47	Pass
7905.51	23.1	5.35	-0.33	28.12	Average Max	V	266	300	54	-25.88	Pass
10520.91	27.16	6.09	1.89	35.14	Average Max	V	232	47	54	-18.86	Pass
13721.76	28.43	7.11	4.58	40.12	Average Max	V	169	160	54	-13.88	Pass

Above 1GHz-40GHz – 802.11a – 5280MHz

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
7550.48	41.84	5.15	-0.41	46.58	Peak Max	V	266	303	74	-27.42	Pass
10559.19	44.89	6.1	1.91	52.9	Peak Max	H	232	42	74	-21.1	Pass
13459.06	46.39	7.04	4.52	57.95	Peak Max	H	168	161	74	-16.05	Pass
7550.48	24.77	5.15	-0.41	29.51	Average Max	H	266	303	54	-24.49	Pass
10559.19	27.14	6.1	1.91	35.15	Average Max	V	232	42	54	-18.85	Pass
13459.06	29.29	7.04	4.52	40.85	Average Max	H	168	161	54	-13.15	Pass

Above 1GHz-40GHz – 802.11a – 5320MHz

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
7431.77	41.83	5.14	-0.39	46.58	Peak Max	H	264	299	74	-27.42	Pass
10640.42	45.22	6.14	1.92	53.28	Peak Max	V	230	49	74	-20.72	Pass
13230.1	46.09	6.99	4.48	57.56	Peak Max	V	161	156	74	-16.44	Pass
7431.77	23.87	5.14	-0.39	28.62	Average Max	H	264	299	54	-25.38	Pass
10640.42	27.65	6.14	1.92	35.71	Average Max	H	230	49	54	-18.29	Pass
13230.1	28.2	6.99	4.48	39.67	Average Max	V	161	156	54	-14.33	Pass

Above 1GHz-40GHz – 802.11n-20M – 5260MHz

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
7223.03	42.15	5.15	-0.32	46.98	Peak Max	V	265	298	74	-27.02	Pass
10520.86	44.96	6.09	1.89	52.94	Peak Max	V	234	44	74	-21.06	Pass
13598.37	47.12	7.08	4.6	58.8	Peak Max	H	169	157	74	-15.2	Pass
7223.03	24.8	5.15	-0.32	29.63	Average Max	H	265	298	54	-24.37	Pass
10520.86	27.06	6.09	1.89	35.04	Average Max	H	234	44	54	-18.96	Pass
13598.37	29.5	7.08	4.6	41.18	Average Max	H	169	157	54	-12.82	Pass
7223.03	42.15	5.15	-0.32	46.98	Peak Max	V	265	298	74	-27.02	Pass

Above 1GHz-40GHz – 802.11n-20M – 5280MHz

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
7825.581	41.57	5.28	-0.32	46.53	Peak Max	V	271	296	74	-27.47	Pass
10559.84	44.88	6.1	1.91	52.89	Peak Max	V	225	44	74	-21.11	Pass
13397.52	46.29	7.03	4.57	57.89	Peak Max	V	161	157	74	-16.11	Pass
7825.581	24.22	5.28	-0.32	29.18	Average Max	H	271	296	54	-24.82	Pass
10559.84	27.04	6.1	1.91	35.05	Average Max	H	225	44	54	-18.95	Pass
13397.52	28.38	7.03	4.57	39.98	Average Max	H	161	157	54	-14.02	Pass

Above 1GHz-40GHz – 802.11n-20M – 5320MHz

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
7838.39	41.58	5.29	-0.32	46.55	Peak Max	H	271	298	74	-27.45	Pass
10640.93	45.25	6.14	1.92	53.31	Peak Max	V	229	49	74	-20.69	Pass
13540.95	47.55	7.06	4.53	59.14	Peak Max	V	161	162	74	-14.86	Pass
7838.39	23.91	5.29	-0.32	28.88	Average Max	H	271	298	54	-25.12	Pass
10640.93	27.69	6.14	1.92	35.75	Average Max	V	229	49	54	-18.25	Pass
13540.95	29.69	7.06	4.53	41.28	Average Max	H	161	162	54	-12.72	Pass

Above 1GHz-40GHz – 802.11n-40M – 5270MHz

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
7580.26	41.22	5.16	-0.41	45.97	Peak Max	H	266	303	74	-28.03	Pass
10379.43	43.77	6.01	1.55	51.33	Peak Max	V	232	47	74	-22.67	Pass
13223.35	46.55	6.99	4.47	58.01	Peak Max	H	170	156	74	-15.99	Pass
7580.26	23.67	5.16	-0.41	28.42	Average Max	V	266	303	54	-25.58	Pass
10379.43	25.83	6.01	1.55	33.39	Average Max	V	232	47	54	-20.61	Pass
13223.35	29.01	6.99	4.47	40.47	Average Max	V	170	156	54	-13.53	Pass

Above 1GHz-40GHz – 802.11n-40M – 5310MHz

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
7871.16	42.2	5.32	-0.32	47.2	Peak Max	H	272	295	74	-26.8	Pass
10620.37	44.57	6.13	1.92	52.62	Peak Max	V	229	47	74	-21.38	Pass
13252.57	47.11	7	4.5	58.61	Peak Max	H	170	161	74	-15.39	Pass
7871.1	24.97	5.32	-0.32	29.97	Average Max	H	272	295	54	-24.03	Pass
10620.37	26.97	6.13	1.92	35.02	Average Max	V	229	47	54	-18.98	Pass
13252.57	29.61	7	4.5	41.11	Average Max	V	170	161	54	-12.89	Pass

Above 1GHz-40GHz – 802.11ac-80M – 5290MHz

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
7358.84	41.75	5.15	-0.36	46.54	Peak Max	H	269	301	74	-27.46	Pass
10579.76	44.31	6.11	1.92	52.34	Peak Max	H	228	41	74	-21.66	Pass
13473.34	45.9	7.04	4.52	57.46	Peak Max	V	161	153	74	-16.54	Pass
7358.84	24.34	5.15	-0.36	29.13	Average Max	V	269	301	54	-24.87	Pass
10579.76	27.07	6.11	1.92	35.1	Average Max	V	228	41	54	-18.9	Pass
13473.34	28.05	7.04	4.52	39.61	Average Max	H	161	153	54	-14.39	Pass

W56 band:
Above 1GHz-40GHz – 802.11a – 5500MHz

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
7806.578	42.02	5.27	-0.32	46.97	Peak Max	V	264	298	74	-27.03	Pass
11000.94	44.32	6.13	1.95	52.4	Peak Max	V	234	44	74	-21.6	Pass
13702.54	46.27	7.11	4.6	57.98	Peak Max	H	168	162	74	-16.02	Pass
7806.578	24.46	5.27	-0.32	29.41	Average Max	V	264	298	54	-24.59	Pass
11000.94	27.15	6.13	1.95	35.23	Average Max	H	234	44	54	-18.77	Pass
13702.54	28.78	7.11	4.6	40.49	Average Max	V	168	162	54	-13.51	Pass

Above 1GHz-40GHz – 802.11a – 5580MHz

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
7243.89	40.74	5.16	-0.33	45.57	Peak Max	V	270	301	74	-28.43	Pass
11159.9	44.84	6.07	2.14	53.05	Peak Max	V	231	41	74	-20.95	Pass
13362.87	46.88	7.02	4.57	58.47	Peak Max	V	163	160	74	-15.53	Pass
7243.8	22.8	5.16	-0.33	27.63	Average Max	H	270	301	54	-26.37	Pass
11159.9	26.86	6.07	2.14	35.07	Average Max	H	231	41	54	-18.93	Pass
13362.87	28.94	7.02	4.57	40.53	Average Max	V	163	160	54	-13.47	Pass

Above 1GHz-40GHz – 802.11a – 5700MHz

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
7783.38	43.01	5.25	-0.32	47.94	Peak Max	H	267	302	74	-26.06	Pass
11400.01	44.78	6.05	2.53	53.36	Peak Max	H	232	49	74	-20.64	Pass
13597.08	47.07	7.08	4.6	58.75	Peak Max	H	166	156	74	-15.25	Pass
7783.38	25.35	5.25	-0.32	30.28	Average Max	H	267	302	54	-23.72	Pass
11400.01	26.84	6.05	2.53	35.42	Average Max	H	232	49	54	-18.58	Pass
13597.08	29.14	7.08	4.6	40.82	Average Max	H	166	156	54	-13.18	Pass

Above 1GHz-40GHz – 802.11n-20M – 5500MHz

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
7726.08	41.36	5.21	-0.32	46.25	Peak Max	H	273	296	74	-27.75	Pass
11000.95	44.32	6.13	1.95	52.4	Peak Max	H	232	41	74	-21.6	Pass
13546.73	47.73	7.06	4.54	59.33	Peak Max	H	167	162	74	-14.67	Pass
7726.0	23.4	5.21	-0.32	28.29	Average Max	V	273	296	54	-25.71	Pass
11000.95	27.2	6.13	1.95	35.28	Average Max	H	232	41	54	-18.72	Pass
13546.73	30.71	7.06	4.54	42.31	Average Max	H	167	162	54	-11.69	Pass

Above 1GHz-40GHz – 802.11n-20M – 5580MHz

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
7126.87	41.85	5.12	-0.29	46.68	Peak Max	V	271	298	74	-27.32	Pass
11159.17	44.91	6.07	2.14	53.12	Peak Max	V	229	47	74	-20.88	Pass
13029.5	47.08	6.91	4.55	58.54	Peak Max	H	161	154	74	-15.46	Pass
7126.87	24.45	5.12	-0.29	29.28	Average Max	V	271	298	54	-24.72	Pass
11159.17	27.47	6.07	2.14	35.68	Average Max	V	229	47	54	-18.32	Pass
13029.5	29.56	6.91	4.55	41.02	Average Max	H	161	154	54	-12.98	Pass

Above 1GHz-40GHz – 802.11n-20M – 5700MHz

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
7780.65	42.64	5.25	-0.32	47.57	Peak Max	H	270	304	74	-26.43	Pass
11400.64	44.75	6.05	2.53	53.33	Peak Max	H	229	45	74	-20.67	Pass
13611.36	46.65	7.08	4.6	58.33	Peak Max	V	161	160	74	-15.67	Pass
7780.65	24.86	5.25	-0.32	29.79	Average Max	V	270	304	54	-24.21	Pass
11400.64	27.08	6.05	2.53	35.66	Average Max	H	229	45	54	-18.34	Pass
13611.36	29.5	7.08	4.6	41.18	Average Max	V	161	160	54	-12.82	Pass

Above 1GHz-40GHz – 802.11n-40M – 5510MHz

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
7056.91	41.32	5.1	-0.27	46.15	Peak Max	H	269	303	74	-27.85	Pass
11019.18	45.21	6.12	1.97	53.3	Peak Max	V	234	46	74	-20.7	Pass
13218.27	46.96	6.99	4.46	58.41	Peak Max	V	168	161	74	-15.59	Pass
7056.91	23.74	5.1	-0.27	28.57	Average Max	V	269	303	54	-25.43	Pass
11019.18	27.39	6.12	1.97	35.48	Average Max	V	234	46	54	-18.52	Pass
13218.27	28.98	6.99	4.46	40.43	Average Max	H	168	161	54	-13.57	Pass

Above 1GHz-40GHz – 802.11n-40M – 5550MHz

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
7672.06	41.85	5.19	-0.32	46.72	Peak Max	V	267	302	74	-27.28	Pass
11100.09	44.63	6.09	2.07	52.79	Peak Max	V	227	45	74	-21.21	Pass
13102.76	46.14	6.94	4.43	57.51	Peak Max	V	163	162	74	-16.49	Pass
7672.06	24.26	5.19	-0.32	29.13	Average Max	H	267	302	54	-24.87	Pass
11100.09	27.62	6.09	2.07	35.78	Average Max	H	227	45	54	-18.22	Pass
13102.76	28.86	6.94	4.43	40.23	Average Max	V	163	162	54	-13.77	Pass

Above 1GHz-40GHz – 802.11n-40M – 5670MHz

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
7912.02	41.7	5.36	-0.33	46.73	Peak Max	H	269	301	74	-27.27	Pass
11340.8	44.56	6.04	2.4	53	Peak Max	V	232	44	74	-21	Pass
13029.42	47.08	6.91	4.55	58.54	Peak Max	V	161	154	74	-15.46	Pass
7912.02	23.9	5.36	-0.33	28.93	Average Max	V	269	301	54	-25.07	Pass
11340.8	26.74	6.04	2.4	35.18	Average Max	V	232	44	54	-18.82	Pass
13029.42	29.2	6.91	4.55	40.66	Average Max	H	161	154	54	-13.34	Pass

Above 1GHz-40GHz – 802.11ac-80M – 5530MHz

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
7309.94	41.81	5.15	-0.35	46.61	Peak Max	V	268	303	74	-27.39	Pass
11059.58	45.34	6.11	2.02	53.47	Peak Max	V	230	42	74	-20.53	Pass
13436.22	47.04	7.04	4.54	58.62	Peak Max	V	164	160	74	-15.38	Pass
7309.94	24.21	5.15	-0.35	29.01	Average Max	V	268	303	54	-24.99	Pass
11059.58	27.37	6.11	2.02	35.5	Average Max	V	230	42	54	-18.5	Pass
13436.22	29.95	7.04	4.54	41.53	Average Max	H	164	160	54	-12.47	Pass

Above 1GHz-40GHz – 802.11ac-80M – 5610MHz

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
7222.39	42.04	5.15	-0.32	46.87	Peak Max	V	265	301	74	-27.13	Pass
11219.26	44.96	6.04	2.21	53.21	Peak Max	V	231	50	74	-20.79	Pass
13273.26	45.91	7	4.52	57.43	Peak Max	V	169	157	74	-16.57	Pass
7222.39	24.27	5.15	-0.32	29.1	Average Max	V	265	301	54	-24.9	Pass
11219.26	27.66	6.04	2.21	35.91	Average Max	H	231	50	54	-18.09	Pass
13273.26	28.75	7	4.52	40.27	Average Max	H	169	157	54	-13.73	Pass

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Conducted Emissions						
R & S Receiver	ESIB 40	100179	06/08/2017	1 Year	06/08/2018	☑
CHASE LISN	MN2050B	1018	08/07/2017	1 Year	08/07/2018	☑
Radiated Emissions						
R & S Receiver	ESIB 40	1018	08/07/2017	1 Year	08/07/2018	☑
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	08/12/2017	1 Year	08/12/2018	☑
Horn Antenna (1GHz~26GHz)	3115	100059	08/25/2017	1 Year	08/25/2018	☑
RF Conducted Measurement						
Spectrum Analyzer	N9010A	10SL0219	08/20/2017	1 Year	08/20/2018	☑
Spectrum Analyzer	N9030B	MY57140374	09/06/2017	1 Year	09/06/2018	☑
R & S Receiver	ESIB 40	100179	06/08/2017	1 Year	06/08/2018	☑
ETS-Lingren USB RF Power Sensor	7002-006	10SL0190	09/03/2017	1 Year	09/03/2018	☑

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		A1, A2, A3, A4, B1, B2, B3, B4, 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		Radio & Telecommunications Terminal Equipment: EN45001 – EN ISO/IEC 17025
		Electromagnetic Compatibility: EN45001 – EN ISO/IEC 17025
Singapore iDA CB(Certification Body)		Phase I, Phase II
Vietnam MIC CAB Accreditation		Please see the document for the detailed scope
Hong Kong OFCA		(Phase II) OFCA Foreign Certification Body for Radio and Telecom
		(Phase I) Conformity Assessment Body for Radio and Telecom
Industry Canada CAB		Radio: Scope A – All Radio Standard Specification in Category I
		Telecom: CS-03 Part I, II, V, VI, VII, VIII

Japan Recognized Certification Body Designation		Radio: A1. Terminal equipment for purpose of calling Telecom: B1. Specified radio equipment specified in Article 38-2, Paragraph 1, Item 1 of the Radio Law
Korea CAB Accreditation		EMI: KCC Notice 2008-39, RRL Notice 2008-3: CA Procedures for EMI KN22: Test Method for EMI EMS: 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
		Radio: 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
		Telecom: 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 NCC CAB Recognition		LP0002, PSTN01, ADSL01, ID0002, IS6100, CNS14336, PLMN07, PLMN01, PLMN08
Taiwan BSMI CAB Recognition		CNS 13438
Japan VCCI		R-3083: Radiation 3 meter site C-3421: Main Ports Conducted Interference Measurement T-1597: Telecommunication Ports Conducted Interference Measurement
Australia CAB Recognition		EMC: AS/NZS CISPR 11, AS/NZS CISPR 14.1, AS/NZS CISPR22, AS/NZS 61000.6.3, AS/NZS 61000.6.4
		Radio communications: 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
		Telecommunications: 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