

RF TEST REPORT

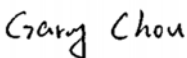
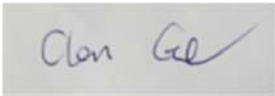


Report No.: FCC_RF_SL15073101-RUC-023_UNII

Supersede Report No.:

Applicant	:	Ruckus Wireless, Inc.
Product Name	:	ZoneFlex R510 Access Point
Model No.	:	R510
Test Standard	:	47 CFR 15.407
Test Method	:	ANSI C63.4: 2014 789033 D02 General UNII Test Procedures New Rules v01
FCC ID	:	S9GR510
IC ID	:	5912A-R510
Dates of test	:	11/01/2015 to 11/20/2015
Issue Date	:	11/20/2015
Test Result	:	☒ Pass ☐ Fail
Equipment complied with the specification ☒		
Equipment did not comply with the specification ☐		

This Test Report is Issued Under the Authority of:

	
Gary Chou	Chen Ge
Test Engineer	Engineer Reviewer
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Issued By:
SIEMIC Laboratories
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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
FCC_RF_SL15073101-RUC-023_UNII	None	Original	11/20/2015

2 Executive Summary

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

Company: Ruckus Wireless, Inc.
Product: ZoneFlex R510 Access Point
Model: R510

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	ZoneFlex R510 Access Point
Model No.	R510
Trade Name	Ruckus
Serial No.	42150600025
Host Model No.	N/A
Input Power	48VDC (PoE)
Power Adapter Manu/Model	N/A
Power Adapter SN	N/A
Date of EUT received	11/02/2015
Equipment Class/ Category	DTS, UNII
Clock Frequencies	N/A
Port/Connectors	PoE, Ethernet
Product Hardware version	705-60429-001
Product Software version	812-72419-002
Radio Hardware version	705-60429-001
Radio Software version	812-72419-002
Test Software version	117-11330-002

6.2 Radio Description

Radio Type	802.11b	802.11g	802.11a	802.11n-HT20	802.11n-HT40	802.11ac
Operating Frequency	2412-2462MHz	2412-2462MHz	5180-5320MHz 5500-5720MHz 5745-5825MHz	2412-2462MHz 5180-5320MHz 5500-5720MHz 5745-5825MHz	2422-2452MHz 5190-5310MHz 5510-5710MHz 5755-5795MHz	5210MHz, 5290MHz 5530MHz, 5610MHz 5690MHz, 5775MHz
Modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Channel Spacing	5MHz	5MHz	20MHz	5MHz(2.4GHz), 20MHz (5GHz)	40MHz	80MHz
Number of Channels	11	11	20	11(2.4GH) 20 (5GHz)	9(2.4GH) 10(5GHz)	6
Antenna Type	Internal Omni PCB Antennas					
Antenna Gain (Peak)	1 dBi (2.4GHz), 3 dBi (5 GHz)					
Antenna Connector Type	U.FL					
Note	N/A					

EUT Power level setting

Mode	Frequency	ART Power Setting
802.11-a	5180	22
802.11-a	5200	22
802.11-a	5240	22
802.11-n-20	5180	22
802.11-n-20	5200	22
802.11-n-20	5240	22
802.11-n-40	5190	19
802.11-n-40	5230	22
802.11-ac-80	5210	17
802.11-a	5745	22
802.11-a	5785	22
802.11-a	5825	22
802.11-n-20	5745	22
802.11-n-20	5785	22
802.11-n-20	5825	22
802.11-n-40	5755	20
802.11-n-40	5795	22
802.11-ac-80	5775	19

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	POE Adapter	740-64157-001	133279963	Ruckus	-

7.2 Cabling Description

Name	Connection Start		Connection Stop		Length / shielding Info		Note
	From	I/O Port	To	I/O Port	Length (m)	Shielding	
RJ45	EUT	RJ45	POE	RJ45	2	Unshielded	-
RJ45	POE	RJ45	Laptop	RJ45	3	Unshielded	-

7.3 Test Software Description

Test Item	Software	Description
RF Testing	Command Line in windows	Set the EUT to transmit continuously in diferent test modes and channels

8 Test Summary

Test Item	Test standard		Test Method/Procedure	Pass / Fail
Restricted Band of Operation	FCC	15.205	ANSI C63.4 – 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	- All measurement uncertainties are not taken into consideration for all presented test result. - 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

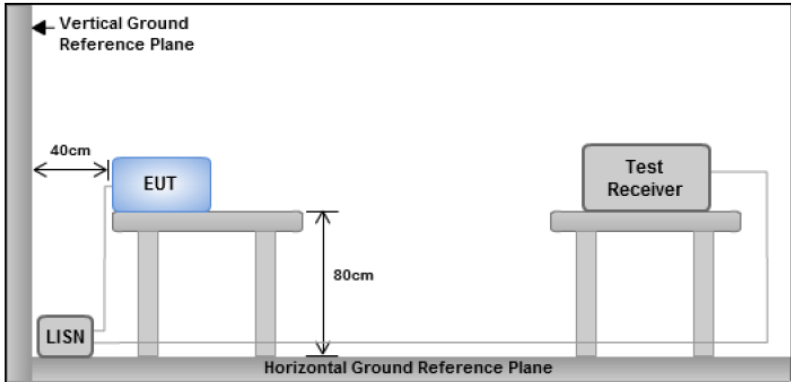
Emissions			
Test Item	Frequency Range	Description	Uncertainty
Band Edge and Radiated Spurious Emissions	30MHz – 1GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
Band Edge and Radiated Spurious Emissions	1GHz – 40GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+4.3dB/-4.1dB

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

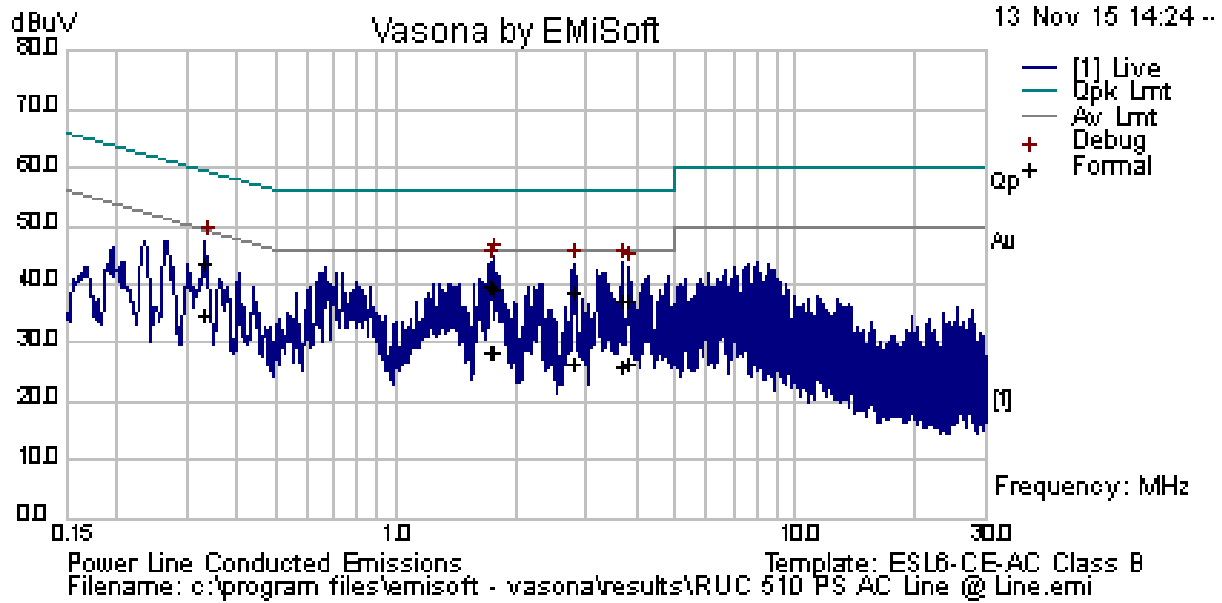
Spec	Item	Requirement	Applicable
47CFR§15.207	a)	For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequency ranges.	☒
Test Setup		 Note: 1. Support units were connected to second LISN. 2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes	
Procedure		- 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. - The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains. - The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable. - All other supporting equipment was powered separately from another main supply.	
Remark		EUT was tested at 120VAC, 60Hz	
Result		☒ Pass ☐ Fail	

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Conducted Emission Test Results

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	21	Result:	☒ Pass ☐ Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
Mains Power:	120Vac, 60Hz			
Tested by:	Teody Manansala			
Test Date:	11/13/2015			
Remarks	Power Supply, Line			

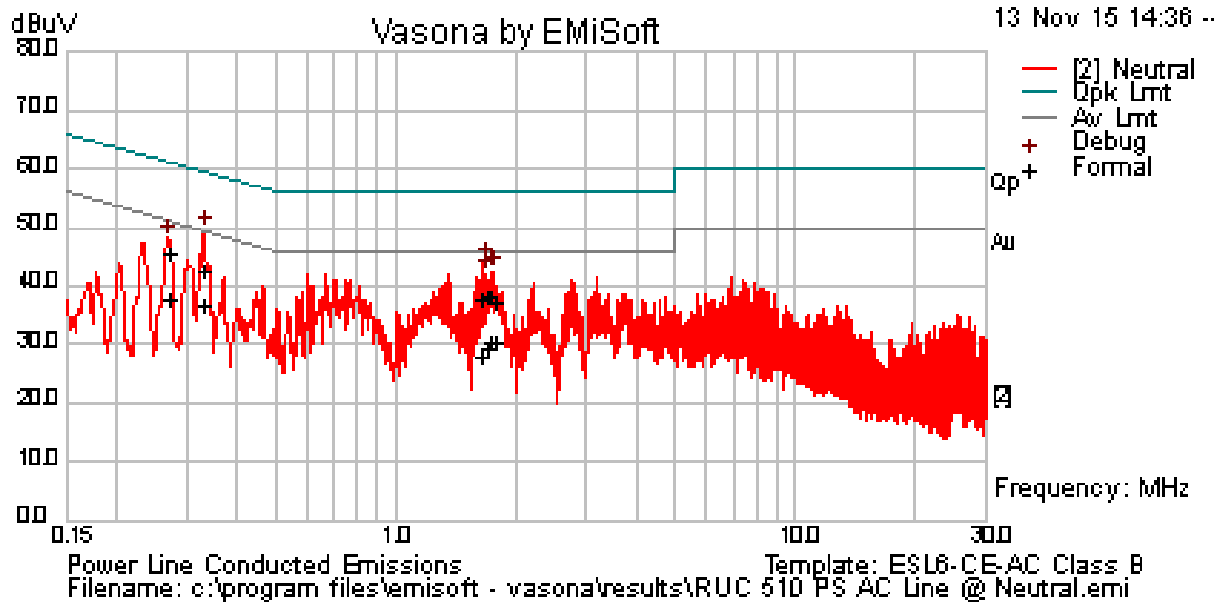


Line Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
1.76	28.86	10.02	0.55	39.43	Quasi Peak	Line	56.00	-16.57	Pass
0.33	32.99	10.01	0.85	43.84	Quasi Peak	Line	59.44	-15.60	Pass
3.68	26.50	10.03	0.55	37.08	Quasi Peak	Line	56.00	-18.92	Pass
1.73	29.13	10.02	0.55	39.71	Quasi Peak	Line	56.00	-16.29	Pass
2.78	28.38	10.03	0.55	38.96	Quasi Peak	Line	56.00	-17.04	Pass
3.81	26.48	10.03	0.55	37.06	Quasi Peak	Line	56.00	-18.94	Pass
1.76	18.01	10.02	0.55	28.59	Average	Line	46.00	-17.41	Pass
0.33	23.98	10.01	0.85	34.83	Average	Line	49.44	-14.60	Pass
3.68	15.20	10.03	0.55	25.78	Average	Line	46.00	-20.22	Pass
1.73	17.95	10.02	0.55	28.53	Average	Line	46.00	-17.47	Pass
2.78	15.86	10.03	0.55	26.43	Average	Line	46.00	-19.57	Pass
3.81	15.82	10.03	0.55	26.40	Average	Line	46.00	-19.60	Pass

Conducted Emission Test Results

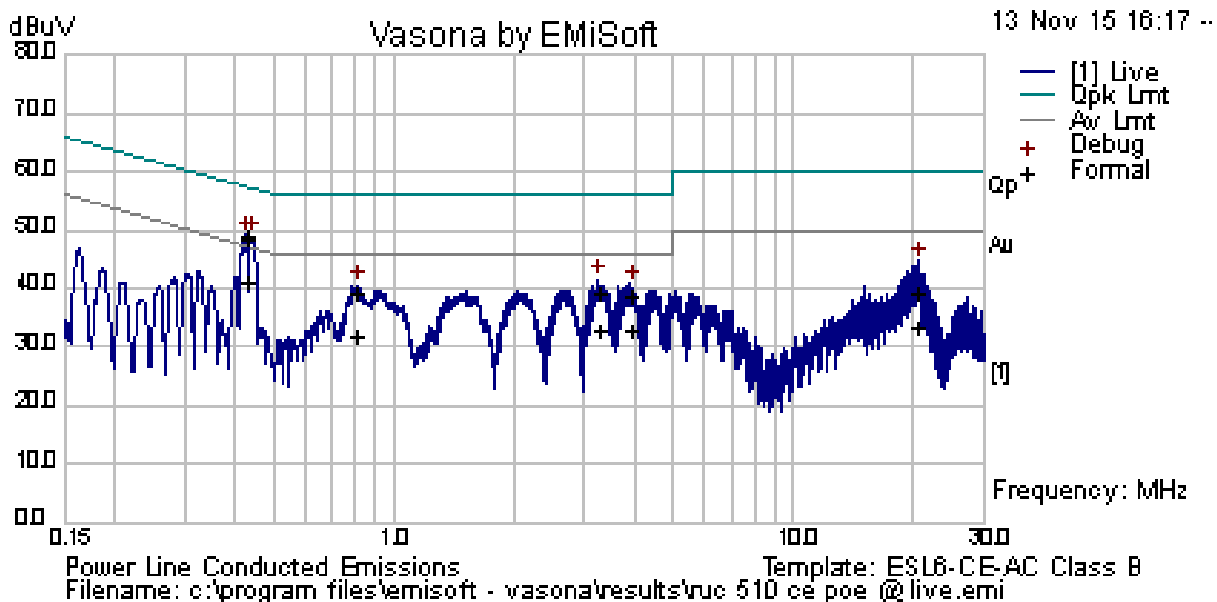
Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	21	Result:	☒ Pass ☐ Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
Mains Power:	120Vac, 60Hz			
Tested by:	Teody Manansala			
Test Date:	11/13/2015			
Remarks	Power Supply, Neutral			



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
0.33	31.92	10.01	0.85	42.78	Quasi Peak	Neutral	59.46	-16.68	Pass
1.65	27.10	10.02	0.56	37.68	Quasi Peak	Neutral	56.00	-18.32	Pass
0.27	34.42	10.00	1.00	45.42	Quasi Peak	Neutral	61.13	-15.71	Pass
1.71	27.90	10.02	0.56	38.48	Quasi Peak	Neutral	56.00	-17.52	Pass
1.77	26.88	10.02	0.55	37.45	Quasi Peak	Neutral	56.00	-18.55	Pass
1.69	27.71	10.02	0.56	38.29	Quasi Peak	Neutral	56.00	-17.71	Pass
0.33	25.94	10.01	0.85	36.79	Average	Neutral	49.46	-12.67	Pass
1.65	17.19	10.02	0.56	27.77	Average	Neutral	46.00	-18.23	Pass
0.27	26.82	10.00	1.00	37.82	Average	Neutral	51.13	-13.31	Pass
1.71	19.72	10.02	0.56	30.29	Average	Neutral	46.00	-15.71	Pass
1.77	19.92	10.02	0.55	30.50	Average	Neutral	46.00	-15.50	Pass
1.69	18.71	10.02	0.56	29.29	Average	Neutral	46.00	-16.71	Pass

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	21	Result:	☒ Pass ☐ Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
Mains Power:	120Vac, 60Hz			
Tested by:	Teody Manansala			
Test Date:	11/13/2015			
Remarks	POE. Line			

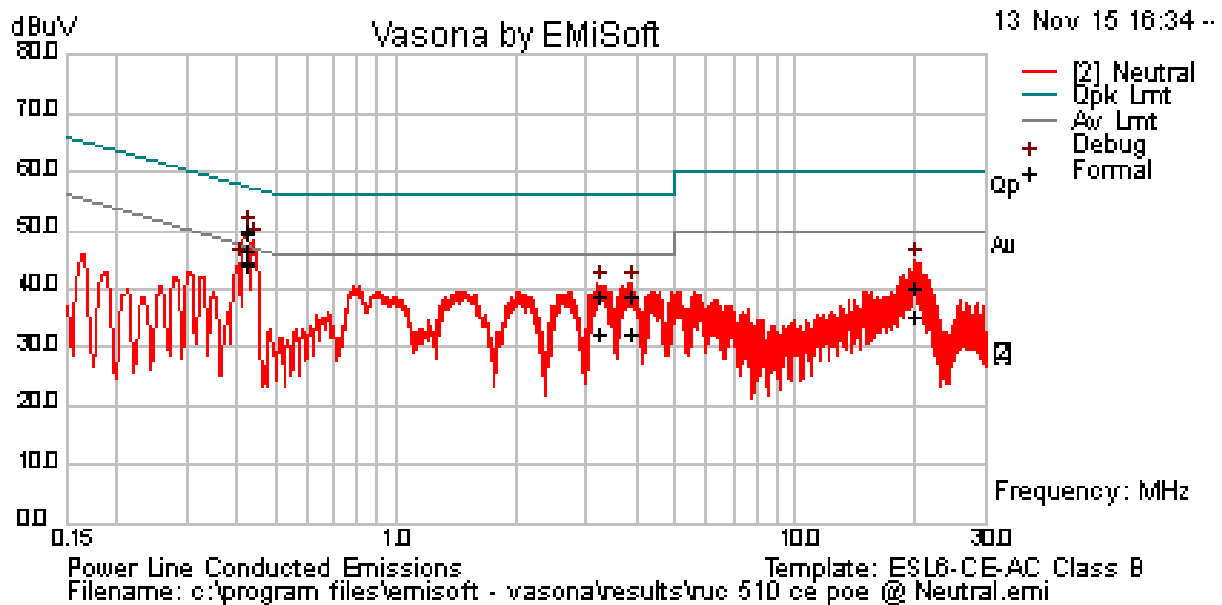


Line Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
0.43	37.61	10.01	0.73	48.35	Quasi Peak	Line	57.30	-8.95	Pass
0.45	38.06	10.01	0.73	48.80	Quasi Peak	Line	57.30	-8.51	Pass
3.26	28.49	10.03	0.55	39.07	Quasi Peak	Line	56.00	-16.93	Pass
3.91	28.20	10.03	0.55	38.78	Quasi Peak	Line	56.00	-17.22	Pass
20.55	28.33	10.07	0.70	39.10	Quasi Peak	Line	60.00	-20.90	Pass
0.81	28.79	10.01	0.60	39.40	Quasi Peak	Line	56.00	-16.60	Pass
0.43	30.39	10.01	0.73	41.12	Average	Line	47.30	-6.18	Pass
0.45	30.61	10.01	0.73	41.35	Average	Line	47.30	-5.95	Pass
3.26	22.21	10.03	0.55	32.79	Average	Line	46.00	-13.21	Pass
3.91	22.25	10.03	0.55	32.84	Average	Line	46.00	-13.16	Pass
20.55	22.66	10.07	0.70	33.43	Average	Line	50.00	-16.57	Pass
0.81	21.16	10.01	0.60	31.77	Average	Line	46.00	-14.23	Pass

Conducted Emission Test Results

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	21	Result:	☒ Pass ☐ Fail
	Humidity (%):	42		
	Atmospheric(mbar):	1021		
Mains Power:	120Vac, 60Hz			
Tested by:	Teody Manansala			
Test Date:	11/13/2015			
Remarks	POE, Neutral			

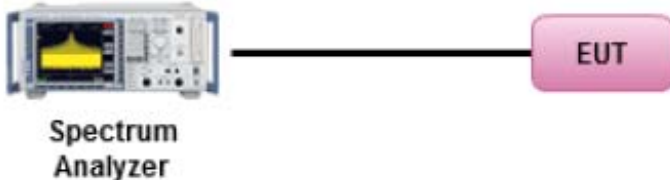


Neutral Plot at 120Vac, 60Hz

Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line / Neutral	Limit (dBuV)	Margin (dB)	Pass /Fail
0.43	39.06	10.01	0.73	49.80	Quasi Peak	Neutral	57.32	-7.52	Pass
0.45	39.10	10.01	0.73	49.84	Quasi Peak	Neutral	57.31	-7.47	Pass
0.42	38.56	10.01	0.73	49.30	Quasi Peak	Neutral	57.41	-8.11	Pass
3.90	27.99	10.03	0.55	38.57	Quasi Peak	Neutral	56.00	-17.43	Pass
3.23	28.09	10.03	0.55	38.67	Quasi Peak	Neutral	56.00	-17.33	Pass
19.96	29.66	10.07	0.69	40.42	Quasi Peak	Neutral	60.00	-19.58	Pass
0.43	33.70	10.01	0.73	44.44	Average	Neutral	47.32	-2.88	Pass
0.45	33.50	10.01	0.73	44.24	Average	Neutral	47.31	-3.07	Pass
0.42	36.01	10.01	0.73	46.75	Average	Neutral	47.41	-0.67	Pass
3.90	21.74	10.03	0.55	32.32	Average	Neutral	46.00	-13.68	Pass
3.23	21.75	10.03	0.55	32.33	Average	Neutral	46.00	-13.67	Pass
19.96	24.46	10.07	0.69	35.22	Average	Neutral	50.00	-14.78	Pass

10.2 26 dB Bandwidth & 6 dB Bandwidth

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407	-	26 dB Emission BW: Report only for reference.	☒
	a) (2)	26 dB Emission BW: Report only for power limit calculation.	☐
	e)	Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.	☒
Test Setup			
Test Procedure	789033 D02 General UNII Test Procedures New Rules v01 <u>26dB Emission bandwidth measurement procedure (Other than 5.725-5.85 GHz)</u> - Allow the trace to stabilize. - Use the spectrum analyzer built-in measurement function to determine the 26dB BW. - o Set RBW = around 1% of emission bandwidth - o Set VBW > RBW - o Detector = Peak - o Trace mode = max hold - Capture the plot. - Repeat above steps for different test channel and other modulation type. <u>6 dB Minimum emission bandwidth measurement procedure (for 5.725-5.85 GHz)</u> - Allow the trace to stabilize. - Use the spectrum analyzer built-in measurement function to determine the 6dB BW. - o Set RBW = 100 KHz - o Set VBW ≥ 3 x RBW - o Detector = Peak - o Trace mode = max hold - o Sweep = auto couple - Capture the plot. - Repeat above steps for different test channel and other modulation type.		
Test Date	11/01/2015 – 11/20/2015	Environmental condition	Temperature 22°C Relative Humidity 38% Atmospheric Pressure 1020mbar
Remark	99% BW result is presented here to show the channels in 5.1GHz is not crossing to DFS channel since the 26 dB BW is too wide.		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A
Test Plot ☒ Yes ☐ N/A

26dB Bandwidth measurement result for 5.2GHz

Type	Test mode	Freq (MHz)	CH	Result (MHz)	Limit (MHz)
26dB BW	802.11a	5180	Low	29.78	-
26dB BW	802.11a	5200	Mid	29.96	-
26dB BW	802.11a	5240	High	29.76	-
26dB BW	802.11n-20	5180	Low	30.00	-
26dB BW	802.11n-20	5200	Mid	27.72	-
26dB BW	802.11n-20	5240	High	29.80	-
26dB BW	802.11n-40	5190	Low	41.77	-
26dB BW	802.11n-40	5230	High	60.00	-
26dB BW	802.11ac-80	5210	Mid	79.10	-

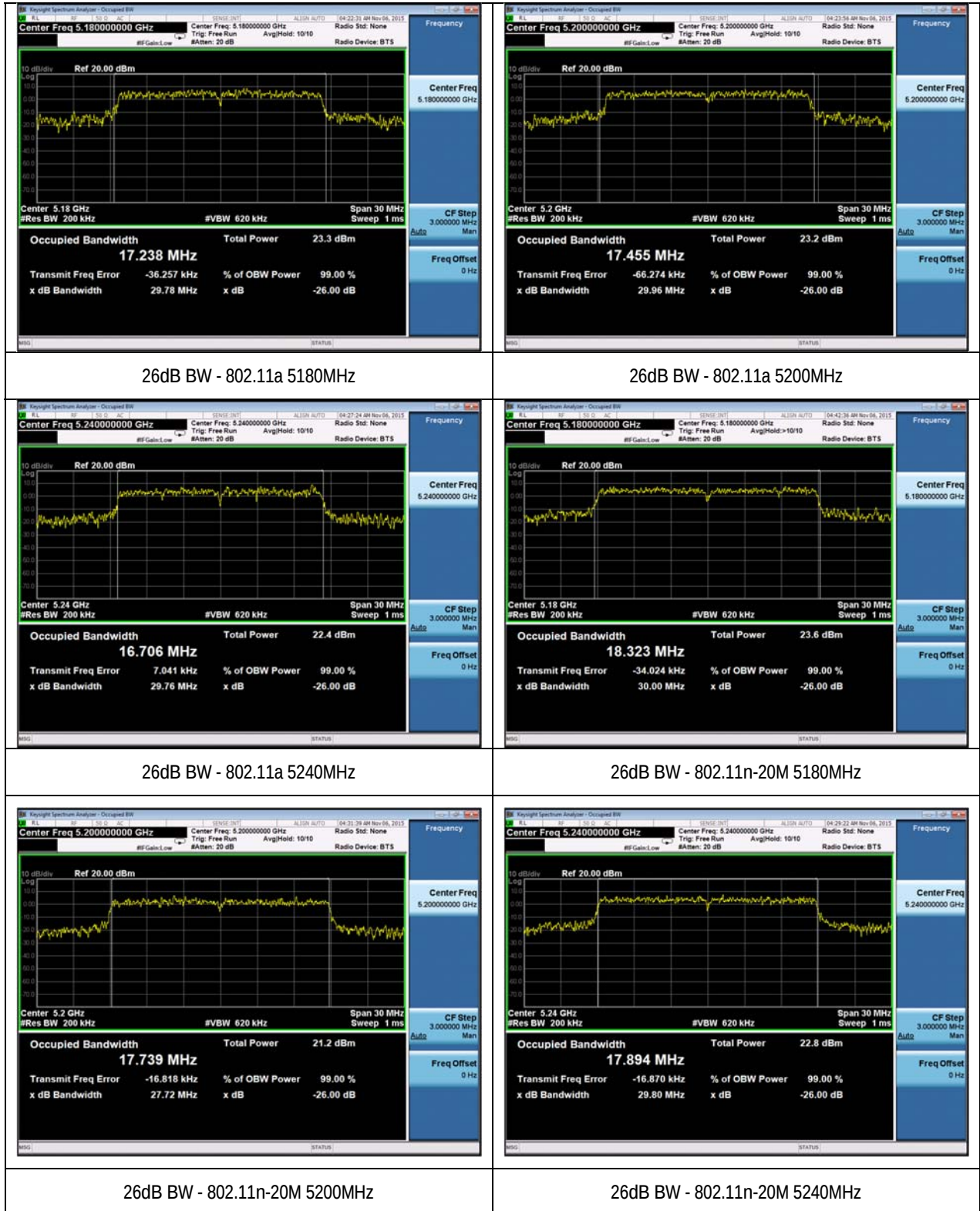
6dB Bandwidth measurement result for 5.8GHz

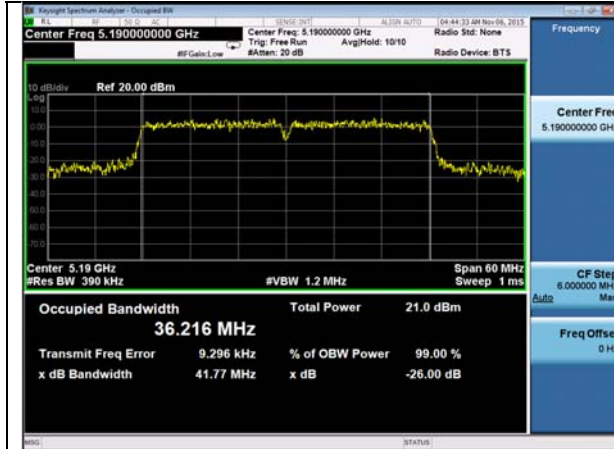
Type	Test mode	Freq (MHz)	CH	Result (MHz)	Limit (MHz)	Result
6dB BW	802.11a	5745	Low	16.40	≥0.5	Pass
6dB BW	802.11a	5785	Mid	16.49	≥0.5	Pass
6dB BW	802.11a	5825	High	16.44	≥0.5	Pass
6dB BW	802.11n-20	5745	Low	17.75	≥0.5	Pass
6dB BW	802.11n-20	5785	Mid	17.72	≥0.5	Pass
6dB BW	802.11n-20	5825	High	17.54	≥0.5	Pass
6dB BW	802.11n-40	5755	Low	35.69	≥0.5	Pass
6dB BW	802.11n-40	5795	High	36.06	≥0.5	Pass
6dB BW	802.11ac-80	5775	Mid	76.19	≥0.5	Pass

99% Occupied Bandwidth measurement result for 5.2GHz

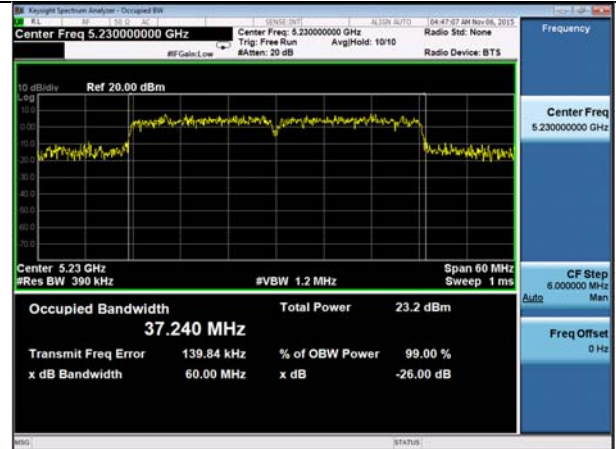
Type	Test mode	Freq (MHz)	CH	Result (MHz)	Limit (MHz)
99% OBW	802.11a	5180	Low	17.23	-
99% OBW	802.11a	5200	Mid	17.45	-
99% OBW	802.11a	5240	High	16.70	-
99% OBW	802.11n-20	5180	Low	18.32	-
99% OBW	802.11n-20	5200	Mid	17.73	-
99% OBW	802.11n-20	5240	High	17.89	-
99% OBW	802.11n-40	5190	Low	36.21	-
99% OBW	802.11n-40	5230	High	37.24	-
99% OBW	802.11ac-80	5210	Mid	75.74	-

26dB Bandwidth Test Plots

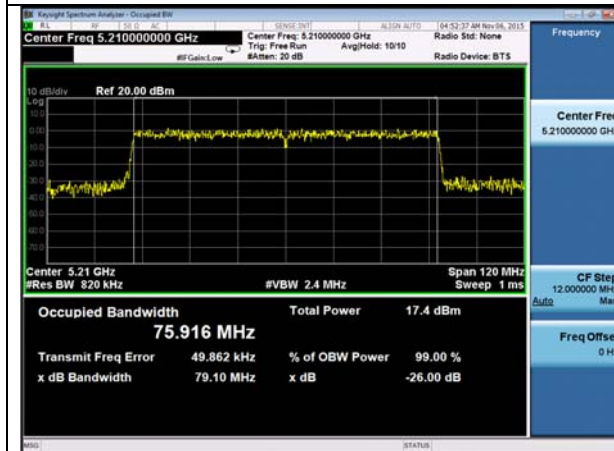




26dB BW - 802.11n-40M 5190MHz

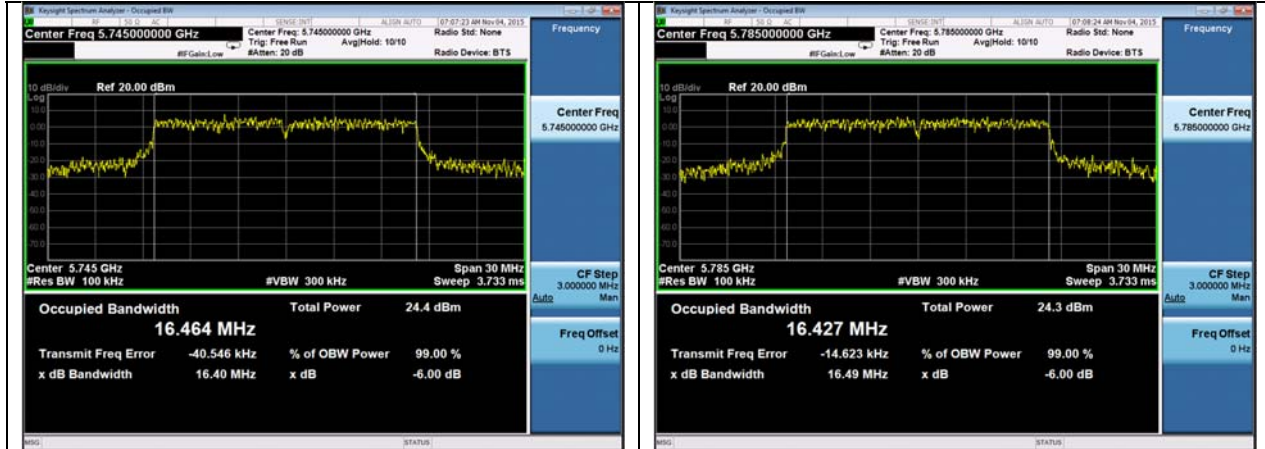


26dB BW - 802.11n-40M 5230MHz



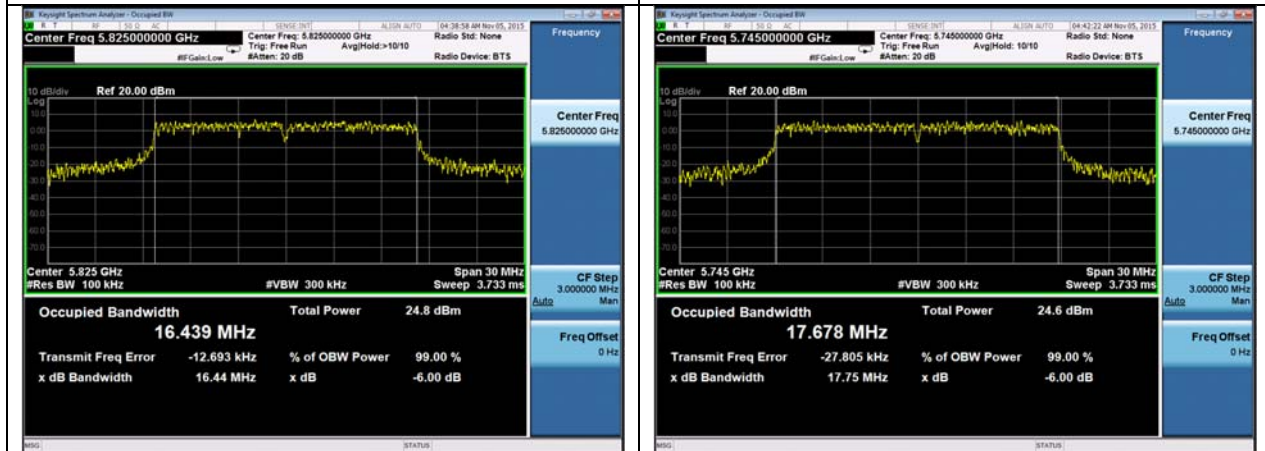
26dB BW - 802.11ac-80M 5210MHz

6dB Bandwidth Test Plots



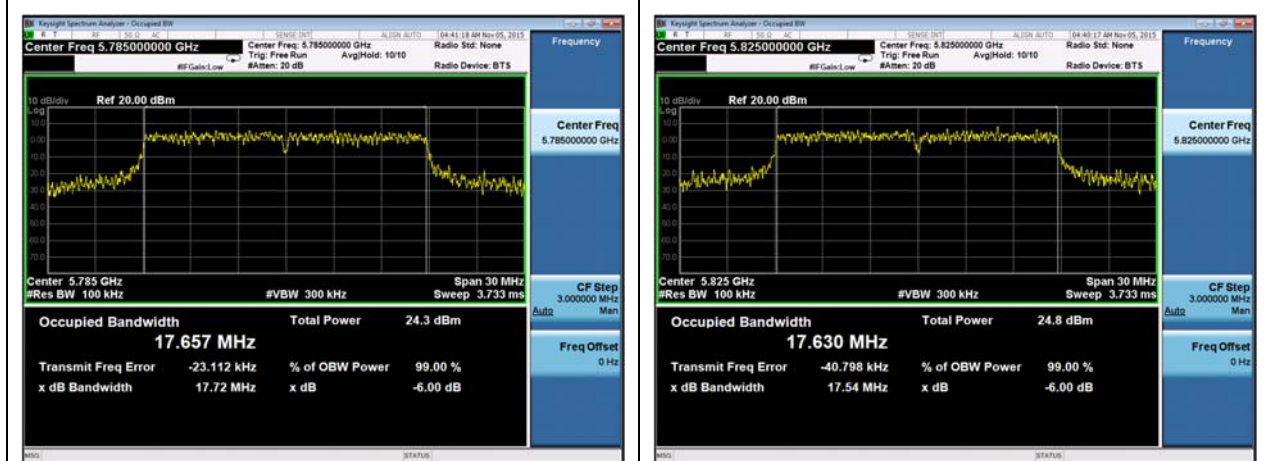
6dB BW 802.11a 5745MHz

6dB BW 802.11a 5785MHz



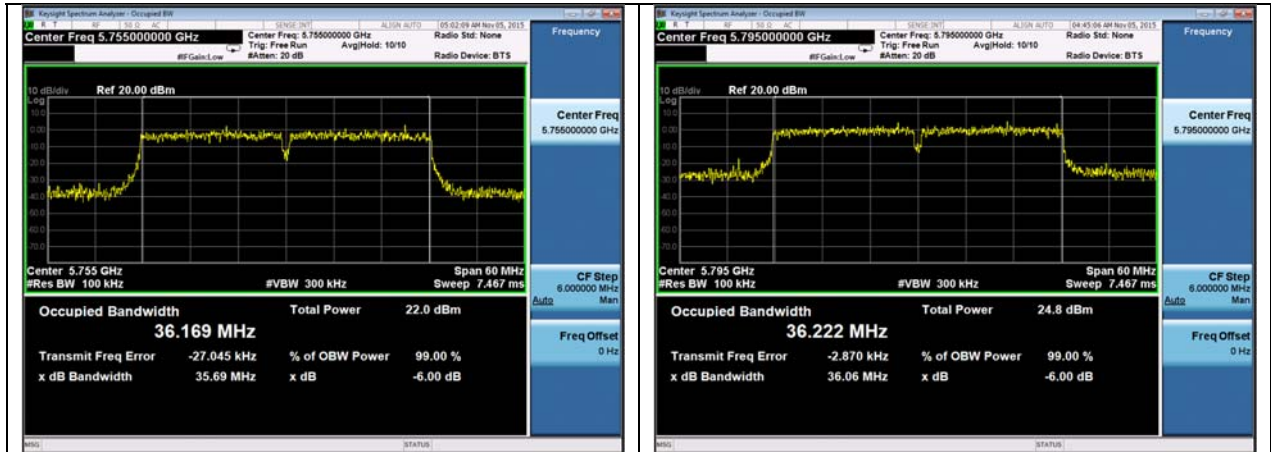
6dB BW 802.11a 5825MHz

6dB BW 802.11n-20M 5745MHz



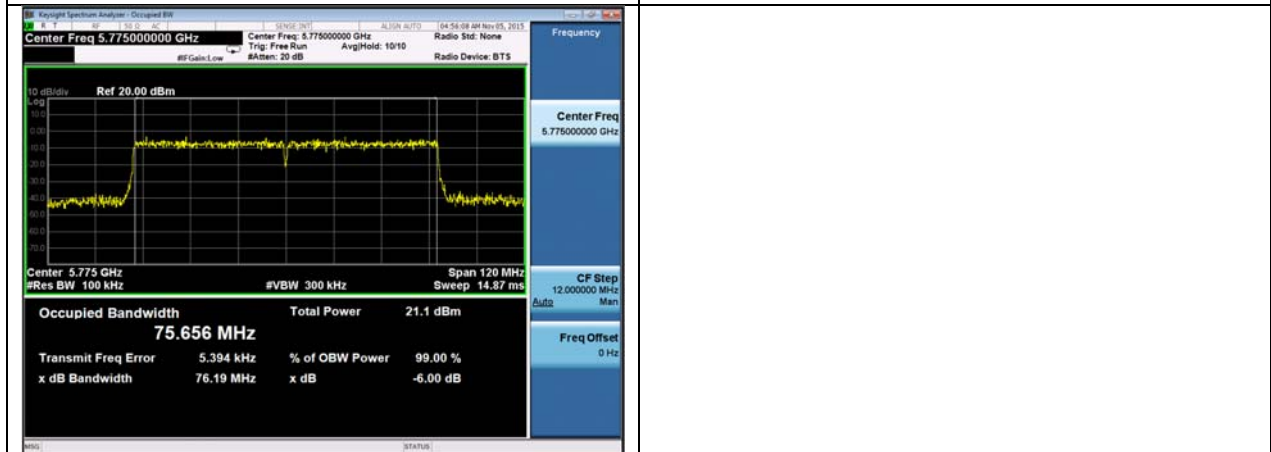
6dB BW 802.11n-20M 5785MHz

6dB BW 802.11n-20M 5825MHz



6dB BW 802.11n-40M 5755MHz

6dB BW 802.11n-40M 5795MHz



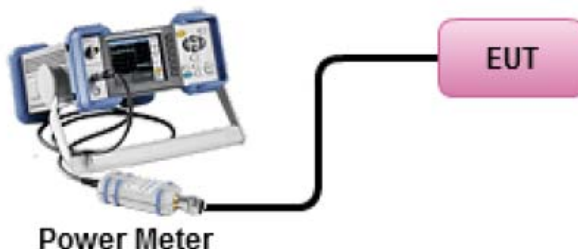
6dB BW 802.11ac-80M 5775MHz

10.3 Output Power

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 conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).	☐
	a)(1)(ii)	For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi.	☒
	a)(1)(iii)	For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.	☐
	a)(1)(iv)	For mobile and portable 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.	☐
	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 v01

Measurement using a Power Meter (PM)

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

- Connect EUT's RF output power to power meter
- Set EUT to be continuous transmission mode
- Measurement the average output power using power meter and record the result
- Repeat above steps for different test channel and other modulation type.

Test Date	11/01/2015 – 11/20/2015	Environmental condition	Temperature 21°C Relative Humidity 40% Atmospheric Pressure 1019mbar
Remark	The EUT has two antennas which are cross-polarized, the directional gain=individual gain of each antenna =3dBi.		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Output Power measurement result for 5.2GHz

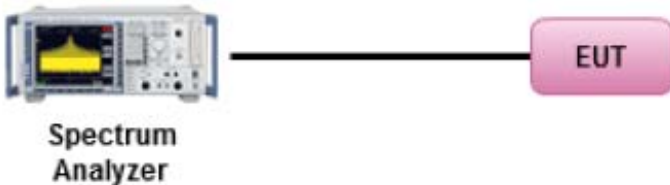
Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
				Chain 0	Chain 1	Highest Power		
Output	802.11a	5180	Low	20.22	18.43	20.22	30	Pass
Output	802.11a	5200	Mid	20.20	17.98	20.20	30	Pass
Output	802.11a	5240	High	19.43	17.80	19.43	30	Pass
Output	802.11n-20M	5180	Low	20.06	18.34	20.06	30	Pass
Output	802.11n-20M	5200	Mid	17.94	17.99	17.99	30	Pass
Output	802.11n-20M	5240	High	19.51	19.52	19.52	30	Pass
Output	802.11n-40M	5190	Low	15.24	13.61	15.24	30	Pass
Output	802.11n-40M	5230	High	20.37	18.52	20.37	30	Pass
Output	802.11ac-80M	5210	-	13.99	15.19	15.19	30	Pass

Output Power Measurement Results for 5.8GHz

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)			Limit (dBm)	Result
				Chain 0	Chain 1	Highest Power		
Output	802.11a	5745	Low	21.27	20.97	21.27	30	Pass
Output	802.11a	5785	Mid	21.17	21.53	21.53	30	Pass
Output	802.11a	5825	High	21.61	21.84	21.84	30	Pass
Output	802.11n-20M	5745	Low	21.24	21.15	21.24	30	Pass
Output	802.11n-20M	5785	Mid	21.23	21.68	21.68	30	Pass
Output	802.11n-20M	5825	High	21.73	22.14	22.14	30	Pass
Output	802.11n-40M	5755	Low	19.14	19.43	19.43	30	Pass
Output	802.11n-40M	5795	Mid	21.86	22.57	22.57	30	Pass
Output	802.11ac-80M	5775	-	18.38	19.01	19.01	30	Pass

10.4 Peak 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 <u>Maximum spectral density measurement procedure</u> - 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	11/01/2015 – 11/20/2015	Environmental condition	Temperature 22°C Relative Humidity 42% Atmospheric Pressure 1020mbar
Remark	The EUT has two antennas which are cross-polarized, the directional gain=individual gain of each antenna =3dBi.		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

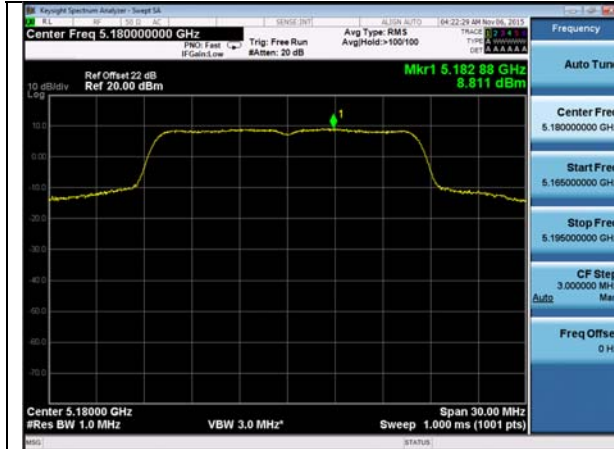
Test Plot ☒ Yes (See below) ☐ N/A

PSD measurement result

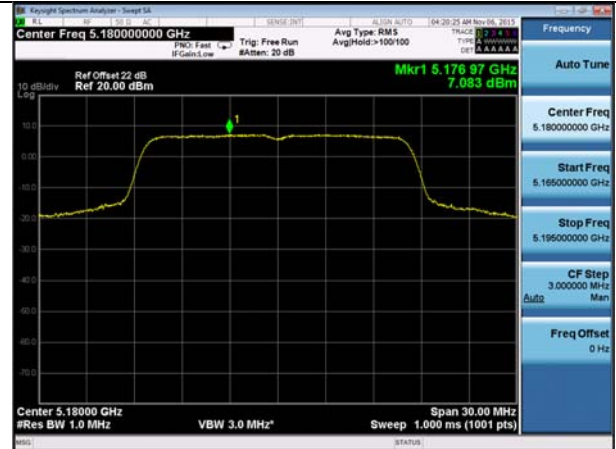
Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/MHz)			Limit (dBm)	Result
				Chain 0	Chain 1	Combined PSD		
PSD	802.11a	5180	Low	8.81	7.08	11.04	17	Pass
PSD	802.11a	5200	Mid	8.99	6.89	11.08	17	Pass
PSD	802.11a	5240	High	8.54	6.66	10.71	17	Pass
PSD	802.11n-20	5180	Low	8.34	6.65	10.59	17	Pass
PSD	802.11n-20	5200	Mid	6.3	6.63	9.48	17	Pass
PSD	802.11n-20	5240	High	8.12	8.14	11.14	17	Pass
PSD	802.11n-40	5190	Low	0.65	-0.88	2.96	17	Pass
PSD	802.11n-40	5230	High	5.87	4.13	8.10	17	Pass
PSD	802.11ac-80	5210	-	-2.39	-3.80	-0.03	17	Pass

Type	Test mode	Freq (MHz)	CH	Conducted PSD (dBm/100kHz)			Combined PSD(dBm/500kHz)	Limit (dBm/500kHz)	Result
				Chain 0	Chain 1	correction factor (dB)			
PSD	802.11a	5745	Low	1.20	0.73	6.99	10.97	30	Pass
PSD	802.11a	5785	Mid	0.95	1.51	6.99	11.24	30	Pass
PSD	802.11a	5825	High	1.45	1.70	6.99	11.58	30	Pass
PSD	802.11n-20	5745	Low	0.93	0.84	6.99	10.89	30	Pass
PSD	802.11n-20	5785	Mid	1.01	1.08	6.99	11.05	30	Pass
PSD	802.11n-20	5825	High	1.18	1.44	6.99	11.31	30	Pass
PSD	802.11n-40	5755	Low	-4.64	-4.29	6.99	5.54	30	Pass
PSD	802.11n-40	5795	High	-1.58	-1.01	6.99	8.71	30	Pass
PSD	802.11ac-80	5775	Mid	-8.63	-8.18	6.99	1.60	30	Pass
Note	BW correction factor = $10\log(500\text{kHz}/\text{RBW})$, RBW was set to 100kHz during test.								

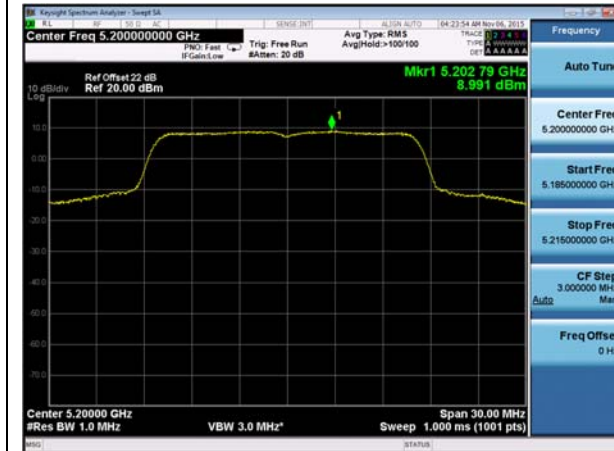
Test Plots



PSD-802.11a-5180M-chain0



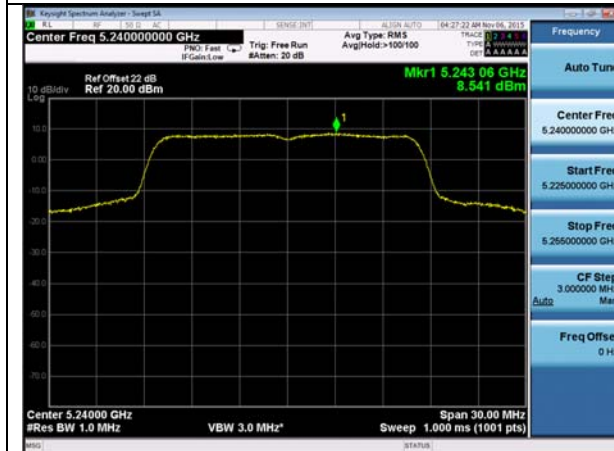
PSD-802.11a-5180M-chain1



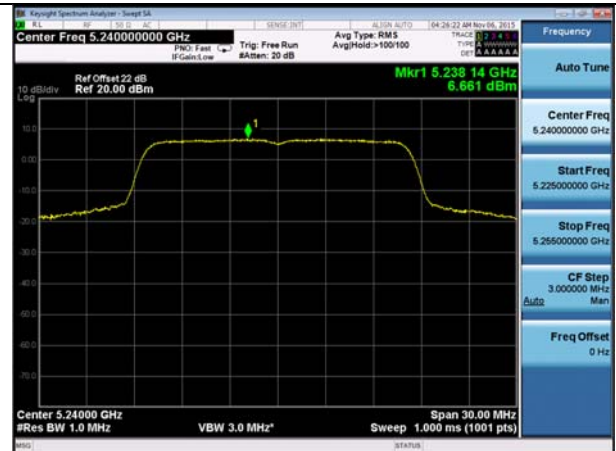
PSD-802.11a-5200M-chain0



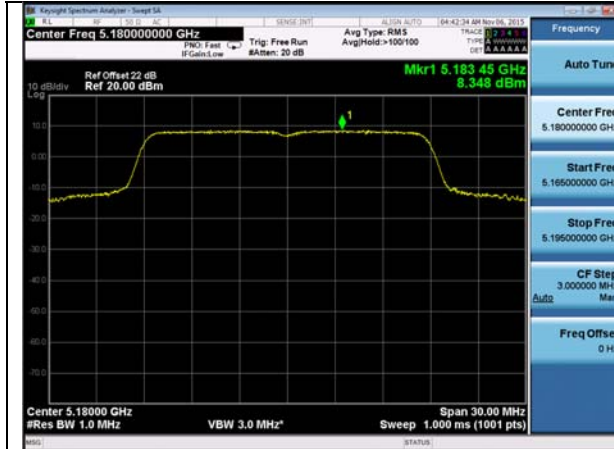
PSD-802.11a-5200M-chain1



PSD-802.11a-5240M-chain0



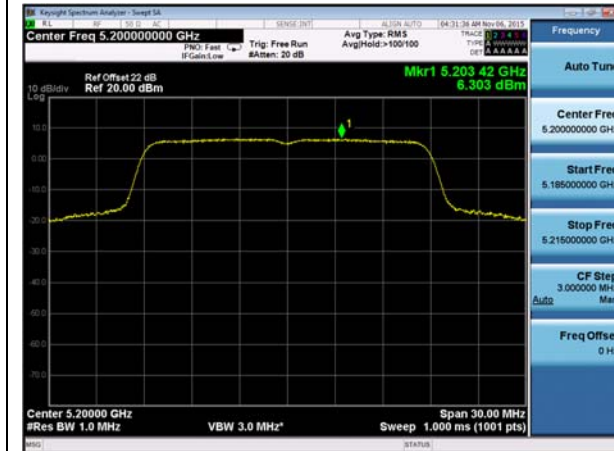
PSD-802.11a-5240M-chain1



PSD-802.11n-20M-5180M-chain0



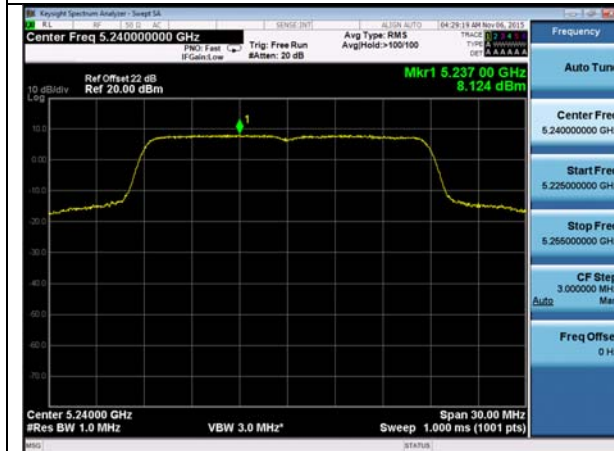
PSD-802.11n-20M-5180M-chain1



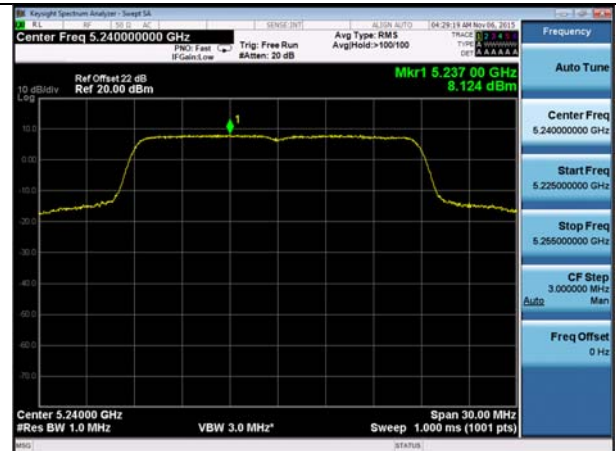
PSD-802.11n-20M-5200M-chain0



PSD-802.11n-20M-5200M-chain1



PSD-802.11n-20M-5240M-chain0



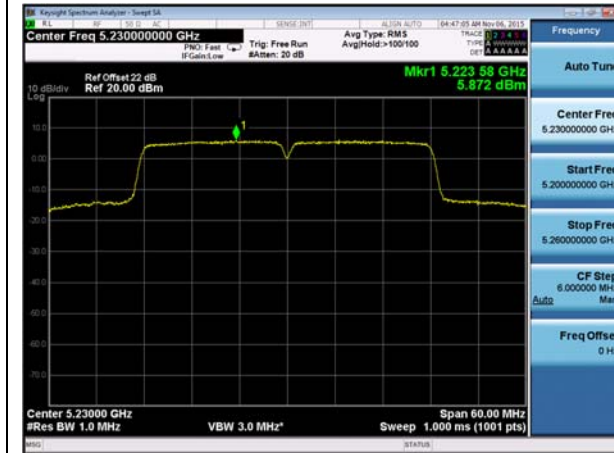
PSD-802.11n-20M-5240M-chain1



PSD-802.11n-40M-5190M-chain0



PSD-802.11n-40M-5190M-chain1



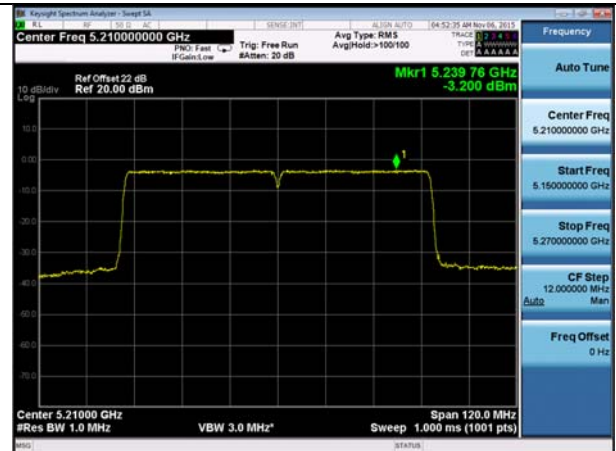
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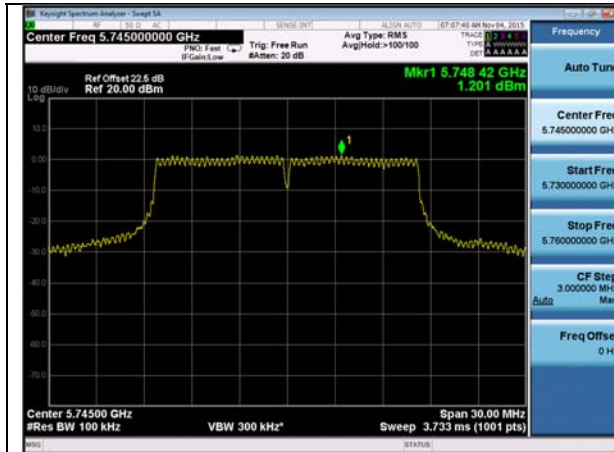
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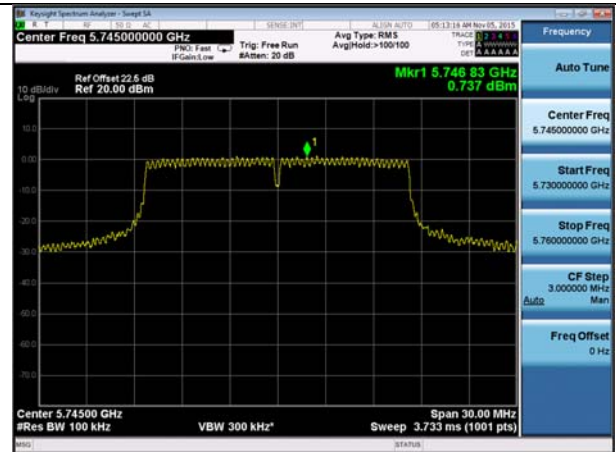
PSD-802.11ac-80M-5210M-chain0



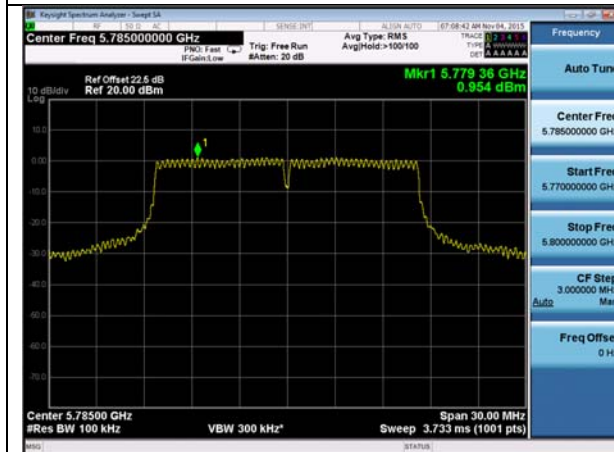
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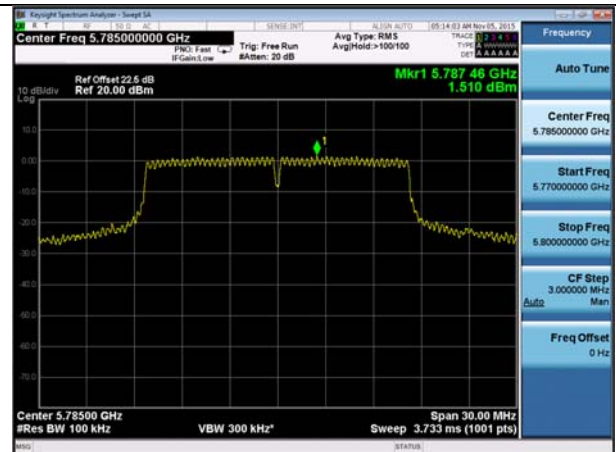
PSD-802.11a-5745M-chain0



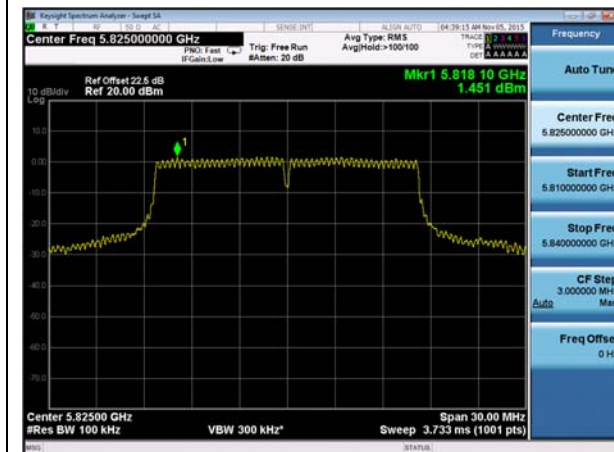
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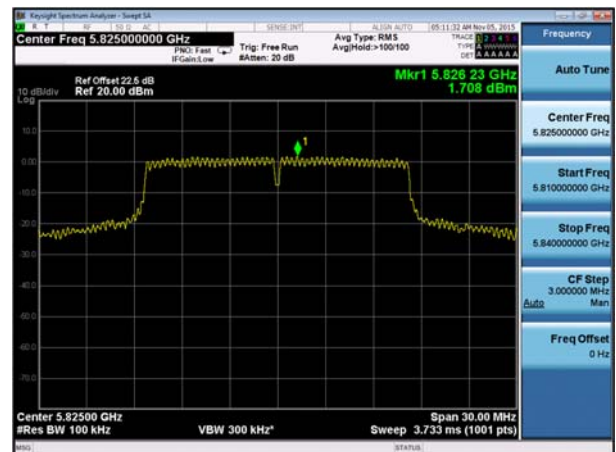
PSD-802.11a-5785M-chain0



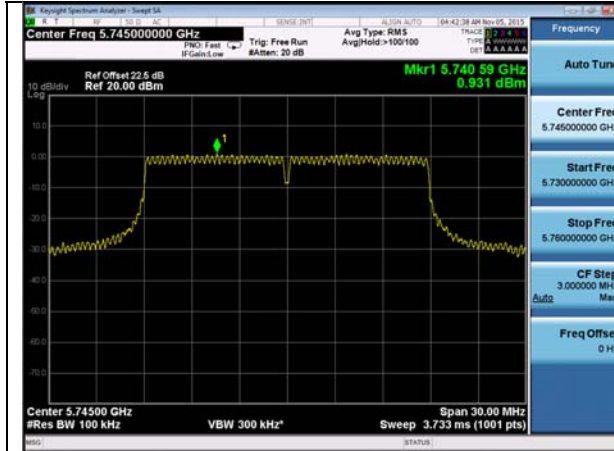
PSD-802.11a-5785M-chain1



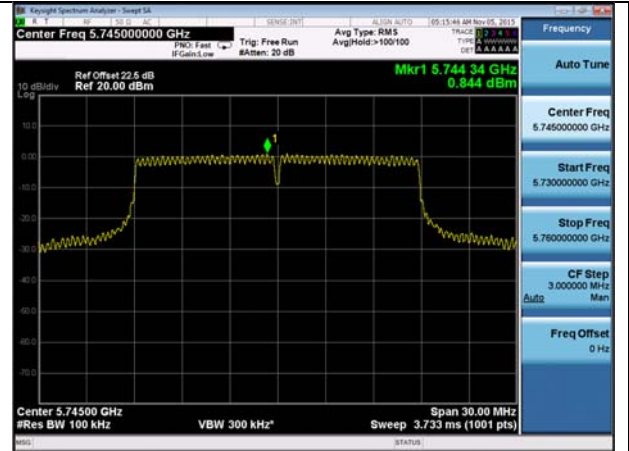
PSD-802.11a-5825M-chain0



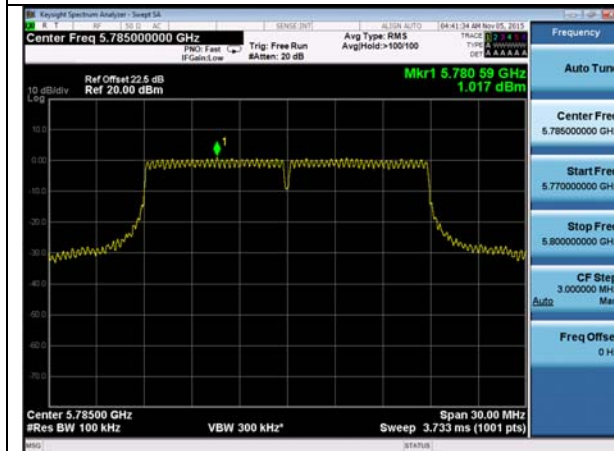
PSD-802.11a-5825M-chain1



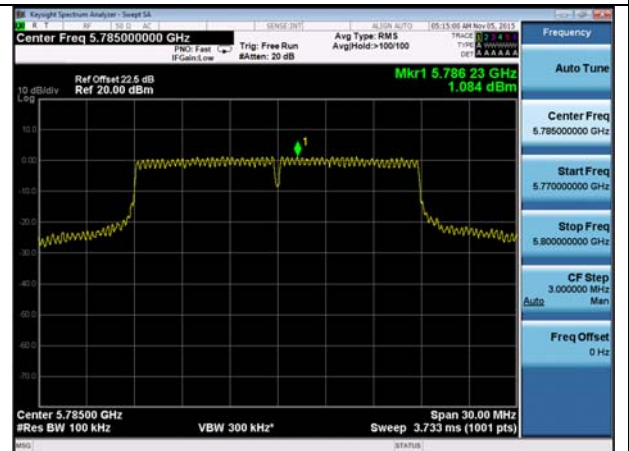
PSD-802.11n-20M-5745M-chain0



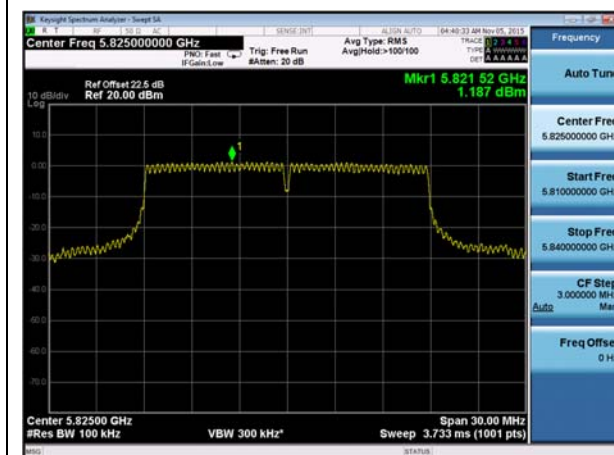
PSD-802.11n-20M-5745M-chain1



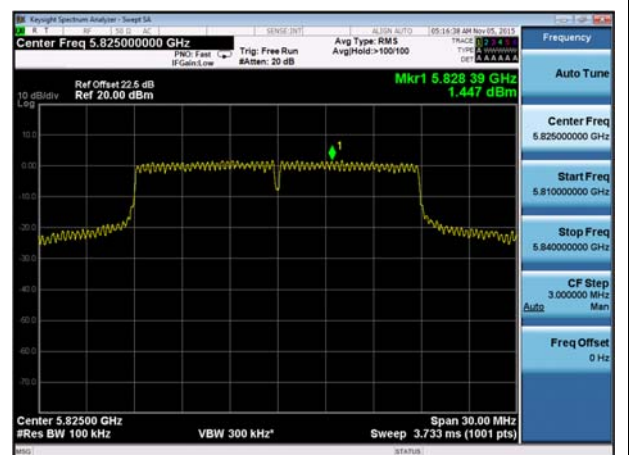
PSD-802.11n-20M-5785M-chain0



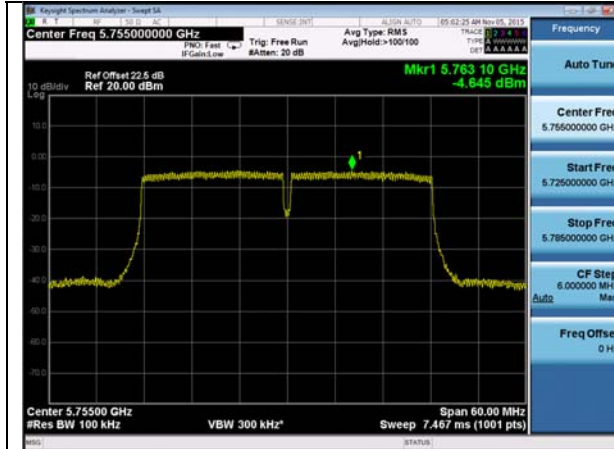
PSD-802.11n-20M-5785M-chain1



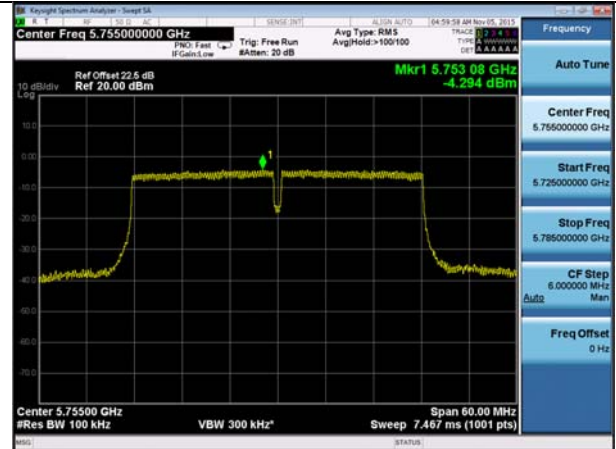
PSD-802.11n-20M-5825M-chain0



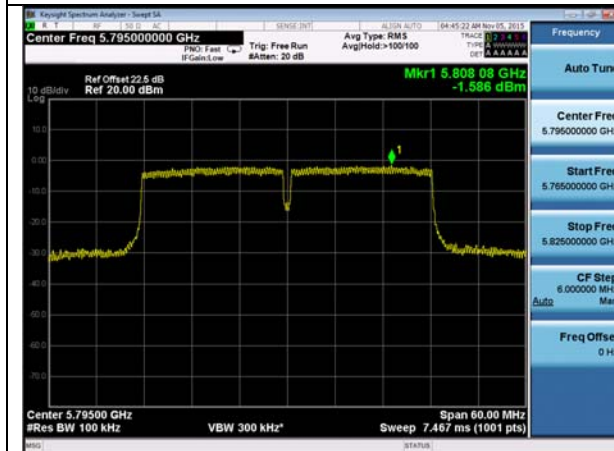
PSD-802.11n-20M-5825M-chain1



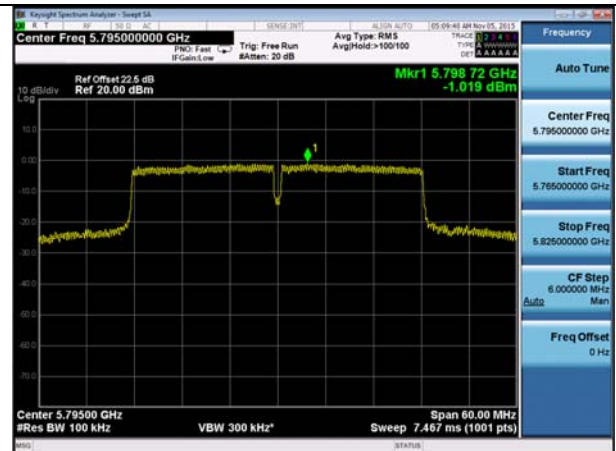
PSD-802.11n-40M-5755M-chain0



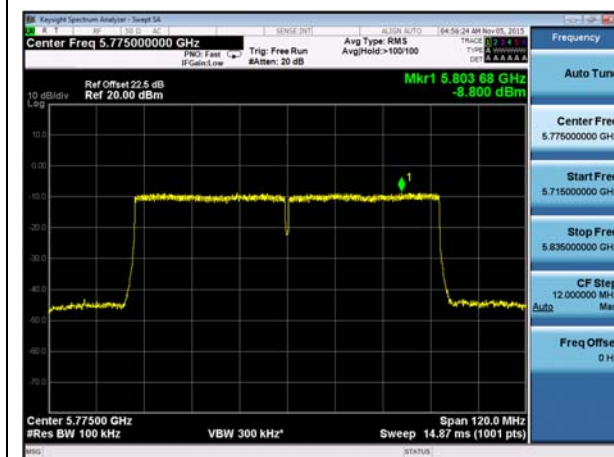
PSD-802.11n-40M-5755M-chain1



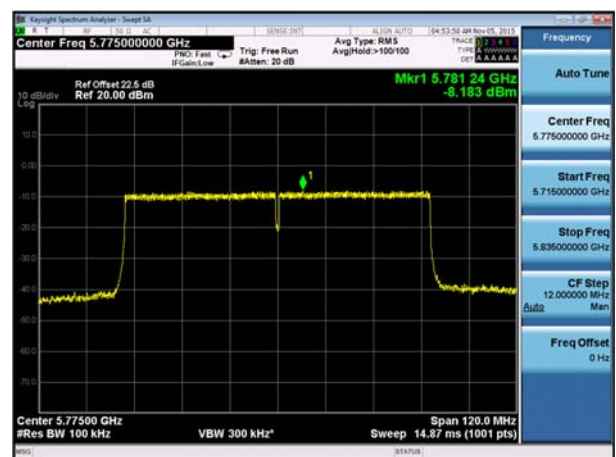
PSD-802.11n-40M-5795M-chain0



PSD-802.11n-40M-5795M-chain1



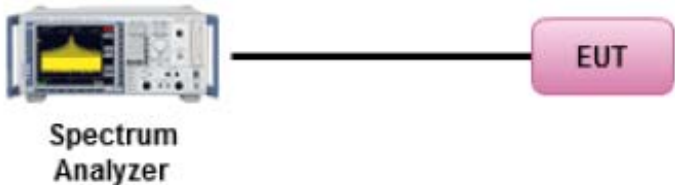
PSD-802.11ac-80M-5775M-chain0



PSD-802.11ac-80M-5775M-chain1

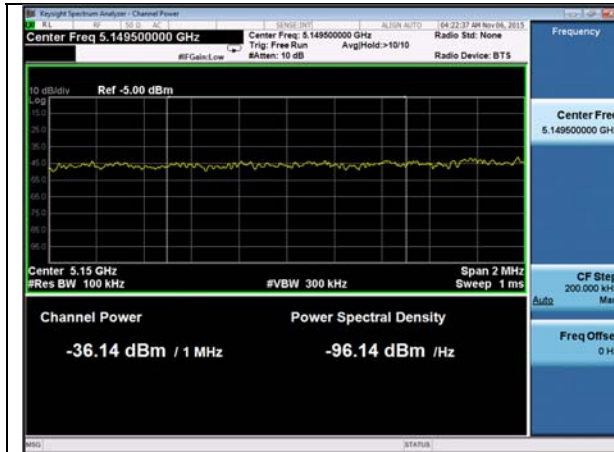
10.5 Band Edge Measurement

Requirement(s):

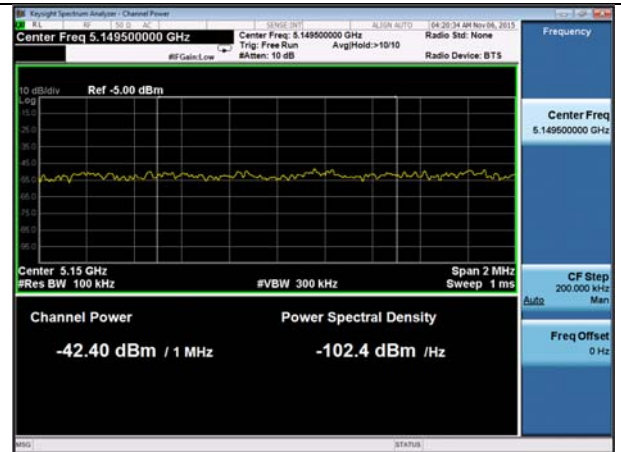
Spec	Item	Requirement	Applicable
47CFR§ 15.407(b)(2), 15.407(b)(6)	(1)	For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.	☒
	(2)	For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 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.	☐
	(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.	☐
	(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.	☒
Test Setup			
Procedure	789033 D02 General UNII Test Procedures New Rules v01, II.F. Method SA-1 <u>Band Edge measurement:</u> - 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: - Set RBW=100kHz - Set VBW=300kHz - Perform a band-power integration across the 1 MHz bandwidth in which the band-edge emission level is to be measured.		
Remark	Antenna gain was added to the offset.		
Result	☒ Pass ☐ Fail		

Test Data ☐ Yes (See below) ☒ N/A
Test Plot ☒ Yes (See below) ☐ N/A

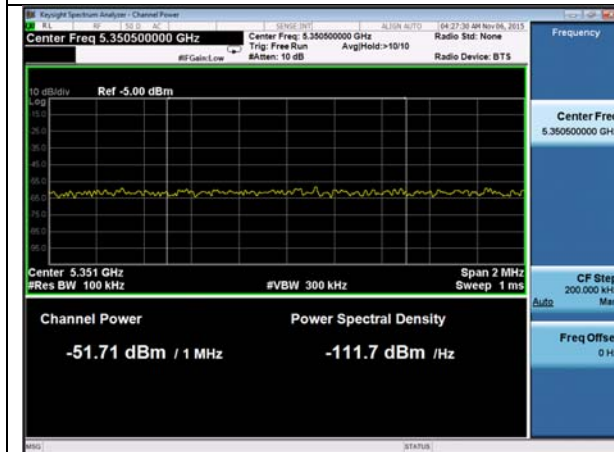
Test Plots



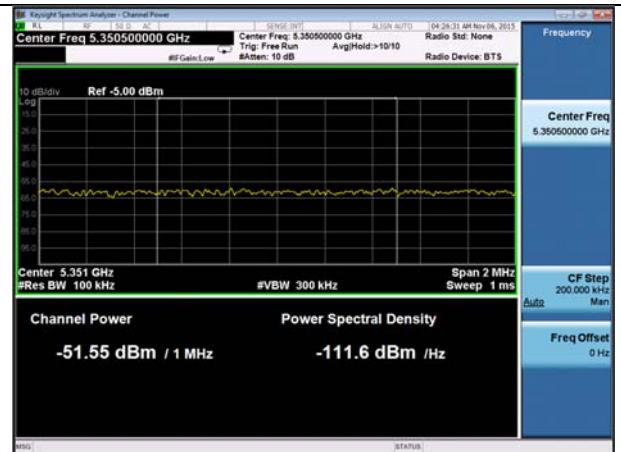
Band Edge-802.11a-5180M-chain0



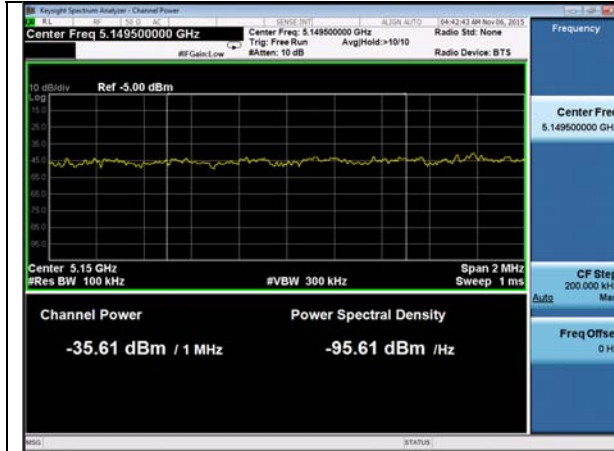
Band Edge-802.11a-5180M-chain1



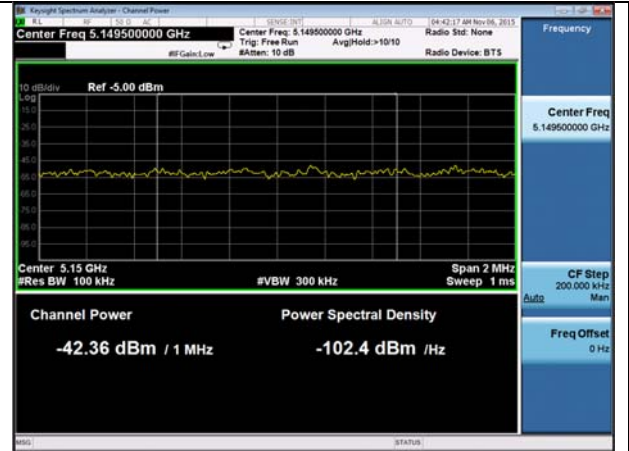
Band Edge -802.11a-5240M-chain0



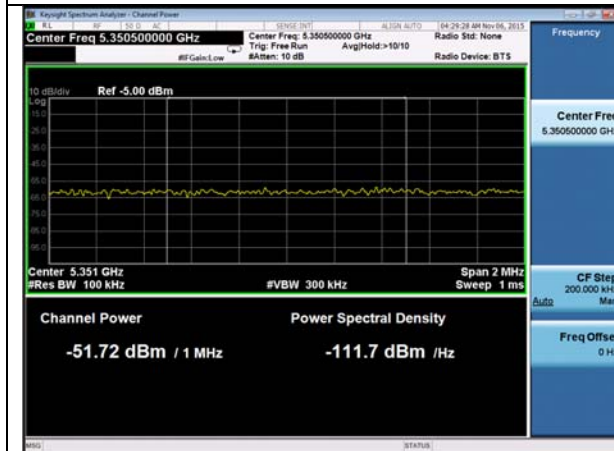
Band Edge -802.11a-5240M-chain1



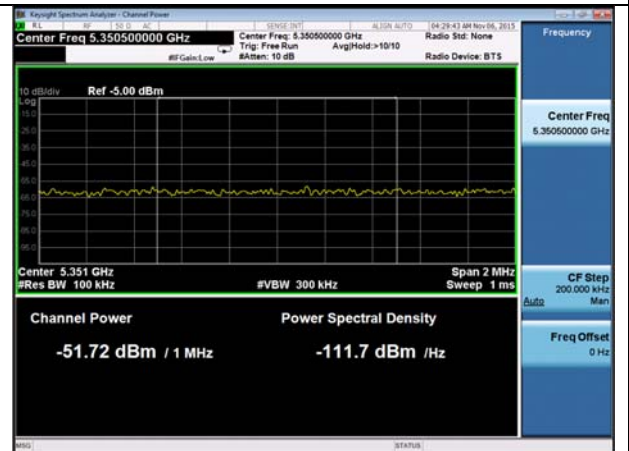
Band Edge -802.11n-20M -5180M-chain0



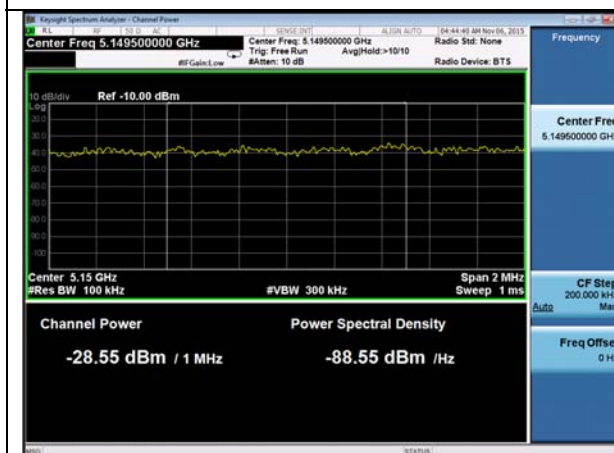
Band Edge -802.11n-20M -5180M-chain1



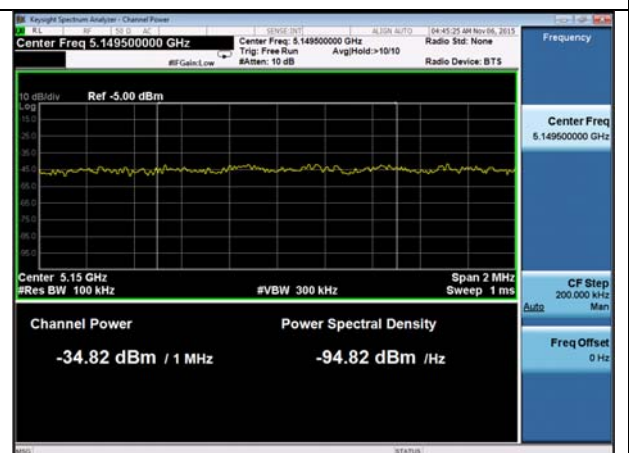
Band Edge -802.11n-20M -5240M-chain0



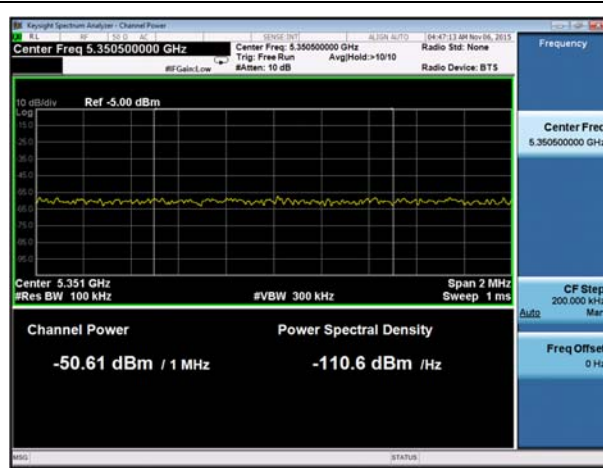
Band Edge -802.11n-20M -5240M-chain1



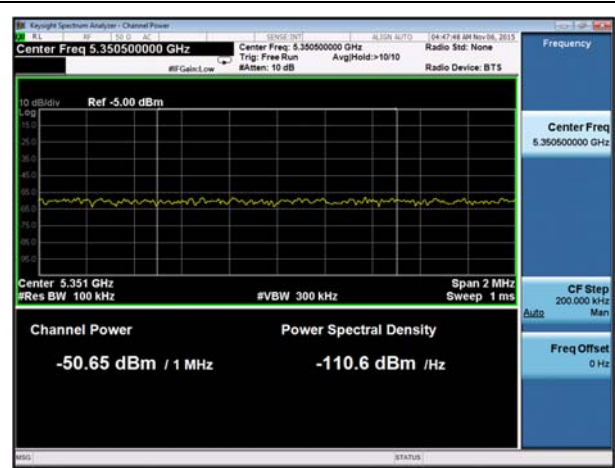
Band Edge -802.11n-40M -5190M-chain0



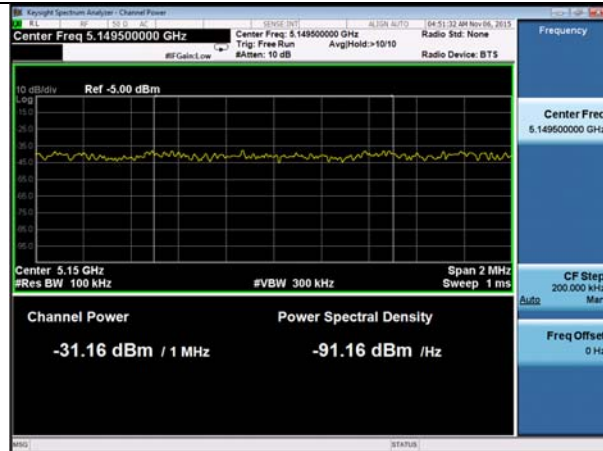
Band Edge -802.11n-40M -5190M-chain1



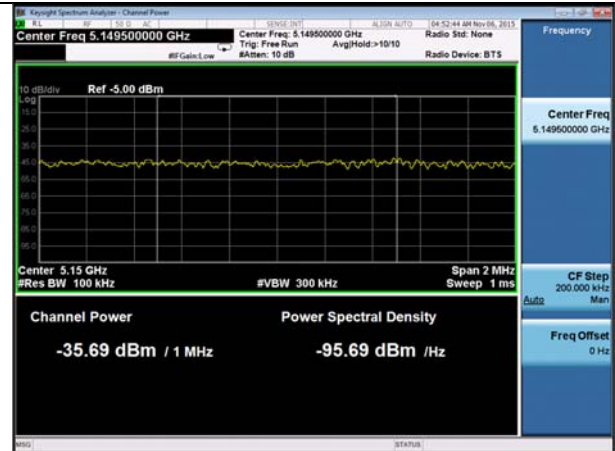
Band Edge -802.11n-40M-5230M-chain0



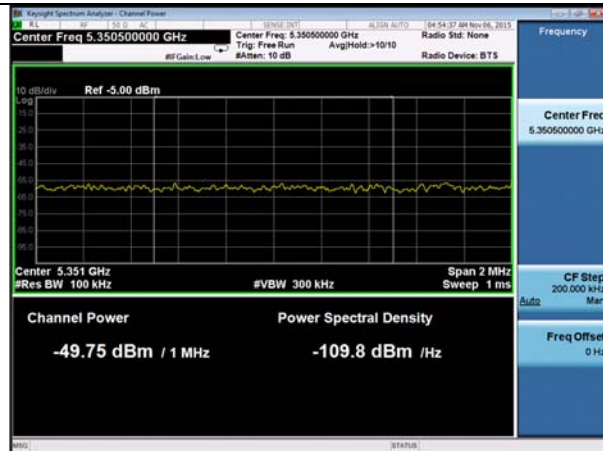
Band Edge -802.11n-40M-5230M-chain1



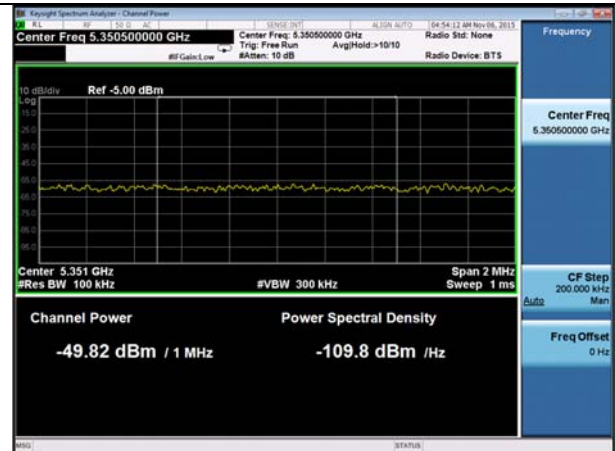
Band Edge -802.11ac-80M-5210M-chain0 (Left)



Band Edge -802.11ac-80M-5210M-chain1(Left)

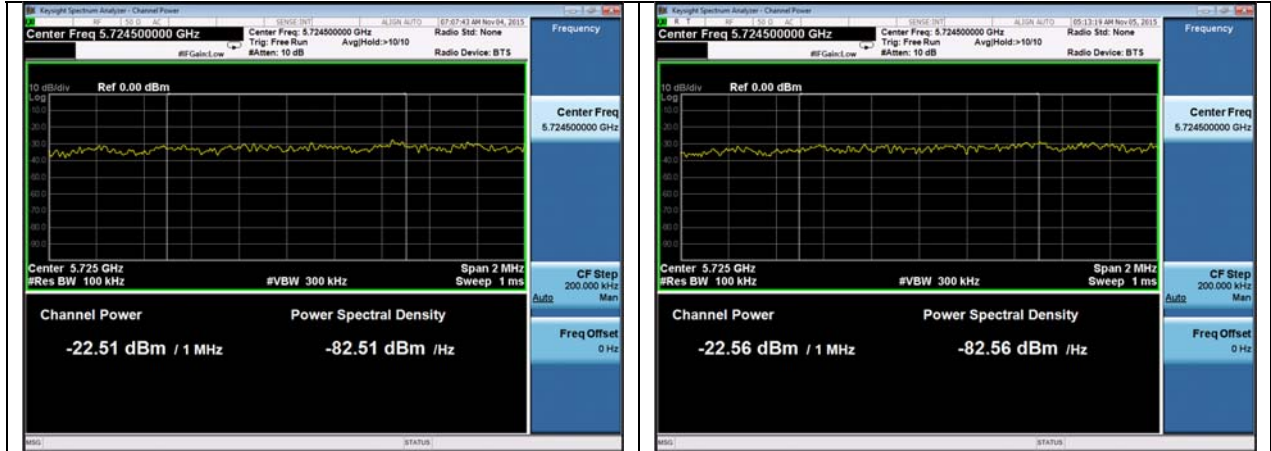


Band Edge -802.11ac-80M-5210M-chain0 (Right)



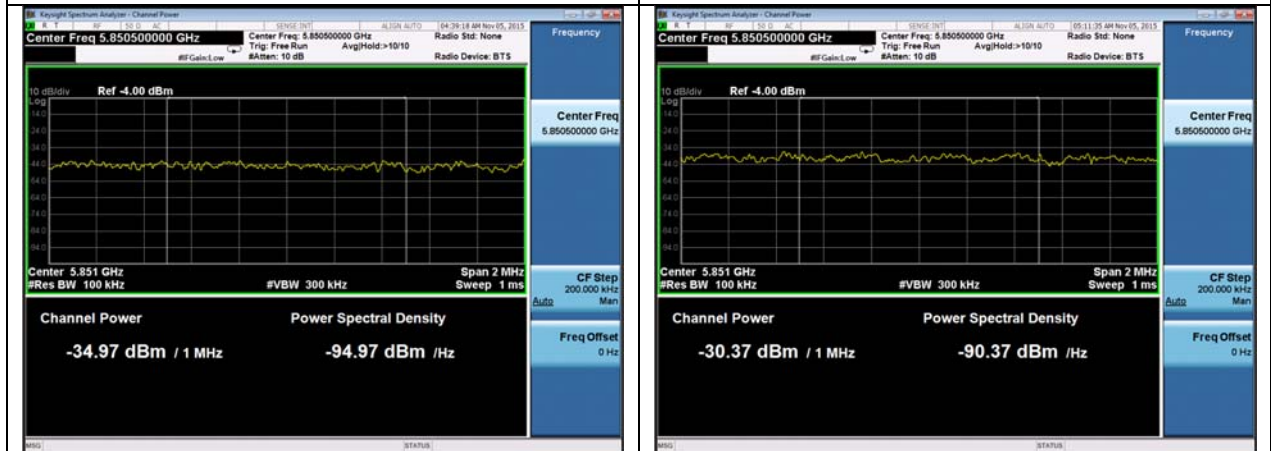
Band Edge -802.11ac-80M-5210M-chain1 (Right)

5.8GHz band: (10MHz offset)



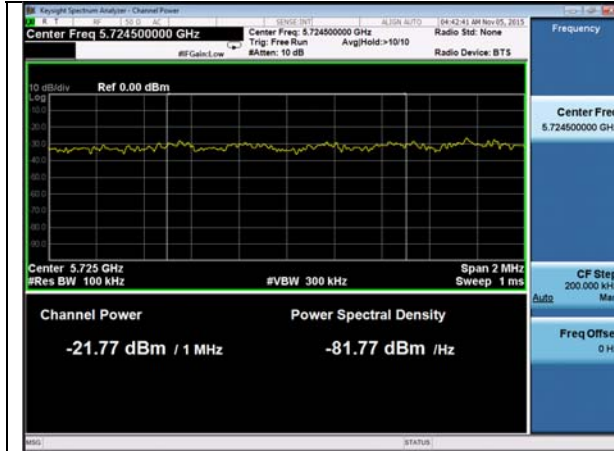
Band Edge -802.11a-5745M-chain0

Band Edge -802.11a-5745M-chain1

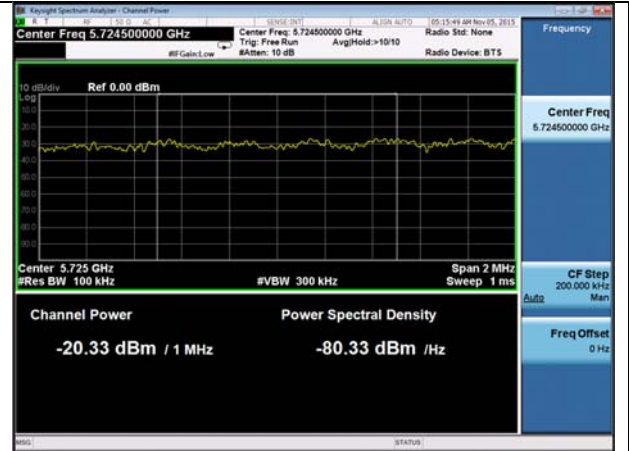


Band Edge -802.11a-5785M-chain0

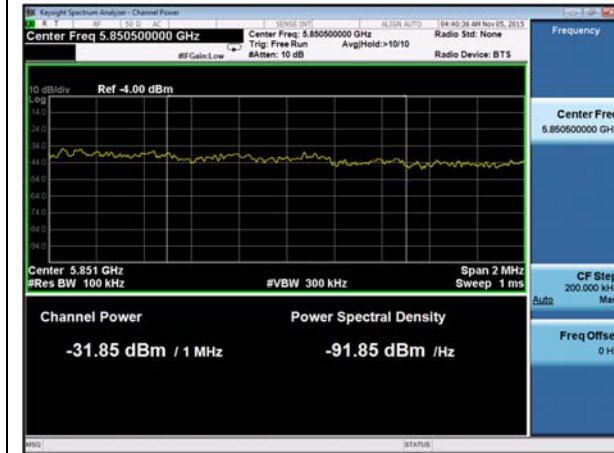
Band Edge -802.11a-5785M-chain1



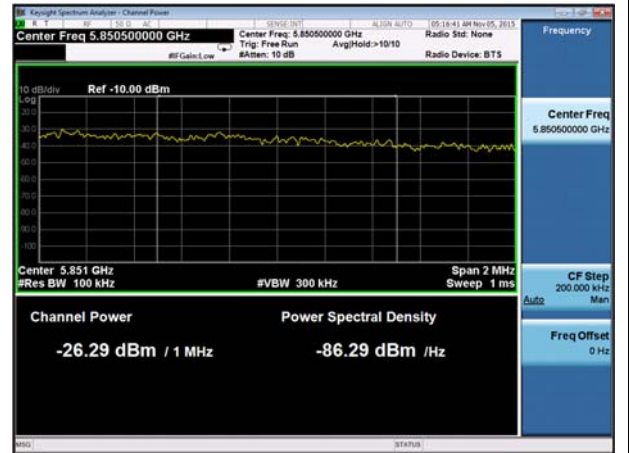
Band Edge -802.11n-20M -5745M-chain0



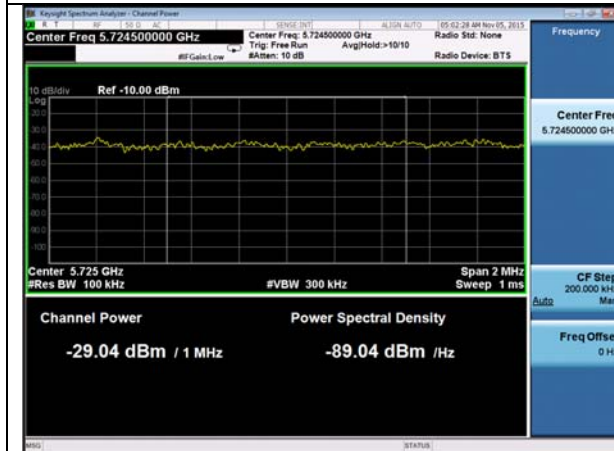
Band Edge -802.11n-20M -5745M-chain1



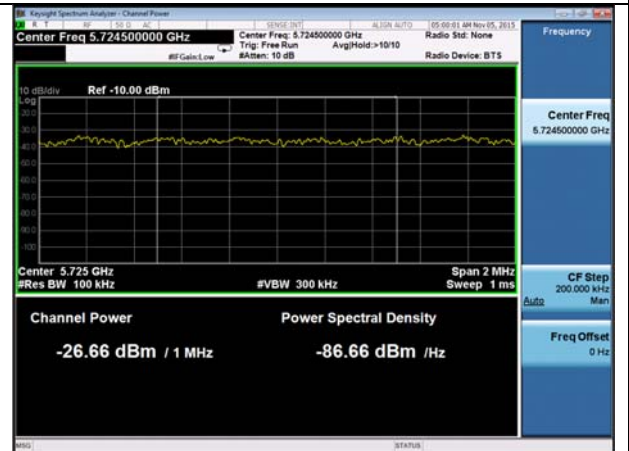
Band Edge -802.11n-20M -5825M-chain0



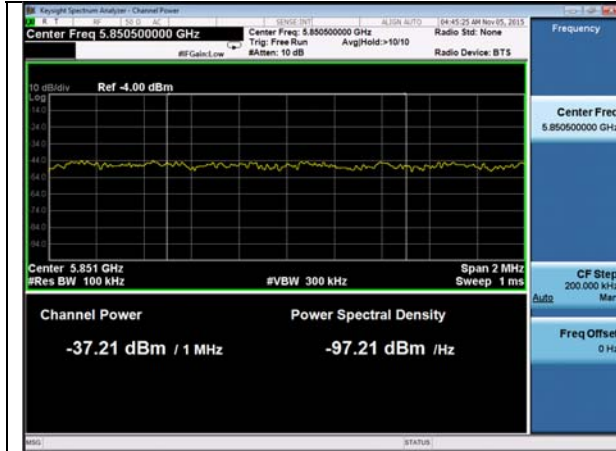
Band Edge -802.11n-20M -5825M-chain1



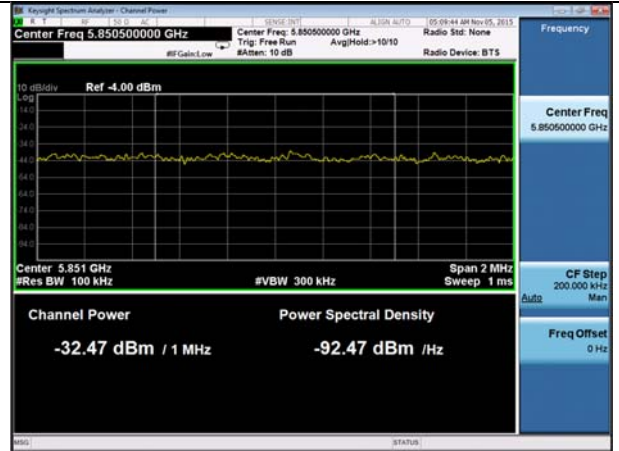
Band Edge -802.11n-40M -5755M-chain0



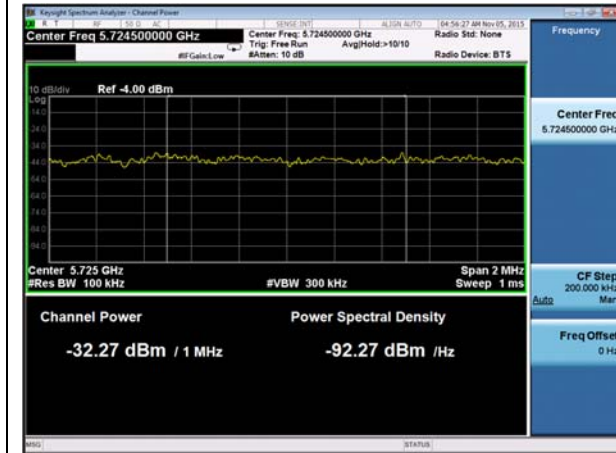
Band Edge -802.11n-40M -5755M-chain1



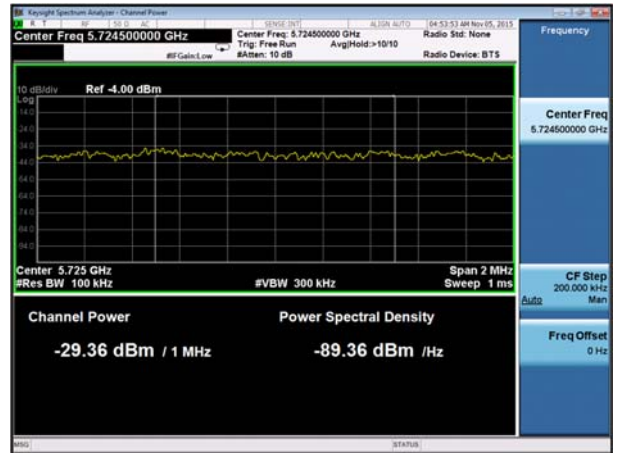
Band Edge -802.11n-40M-5795M-chain0



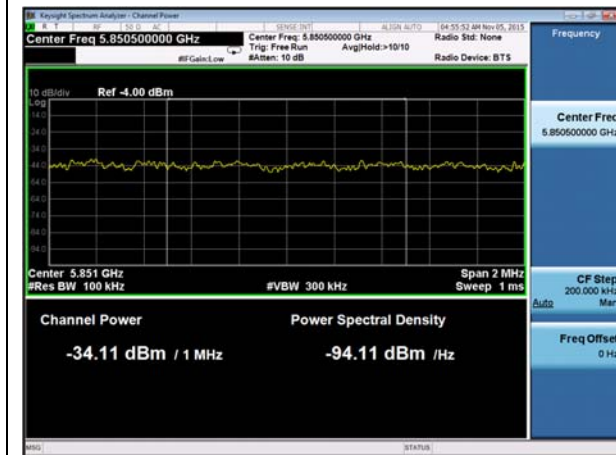
Band Edge -802.11n-40M-5795M-chain1



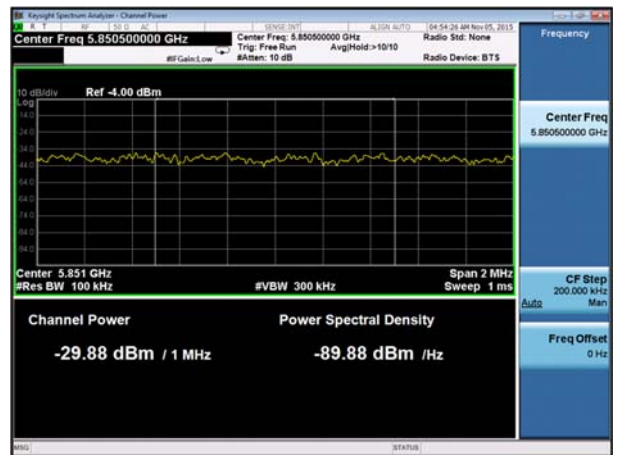
Band Edge -802.11ac-80M-5775M-chain0 (Left)



Band Edge -802.11ac-80M-5775M-chain1 (Left)

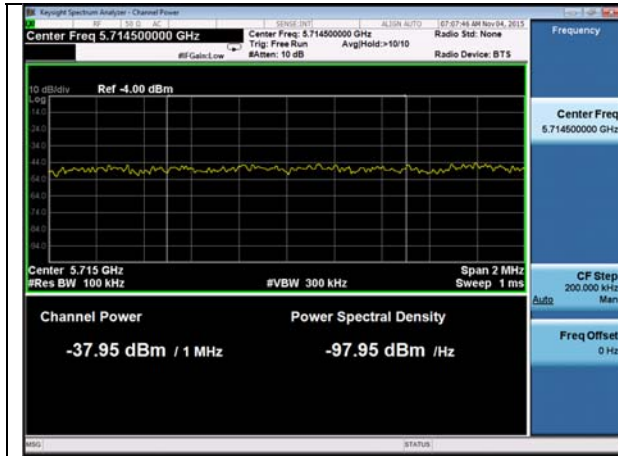


Band Edge -802.11ac-80M-5775M-chain0 (Right)

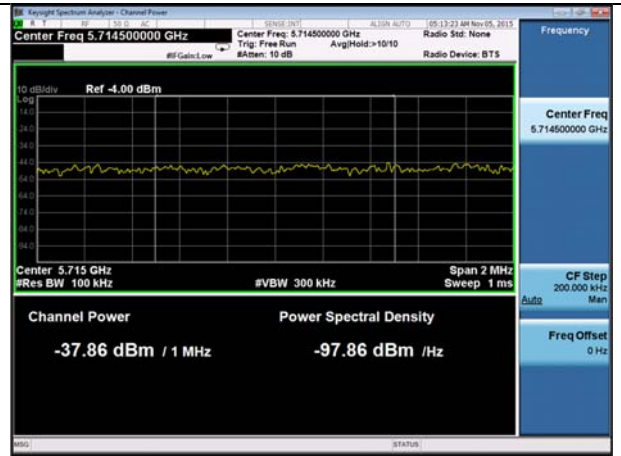


Band Edge -802.11ac-80M-5775M-chain1 (Right)

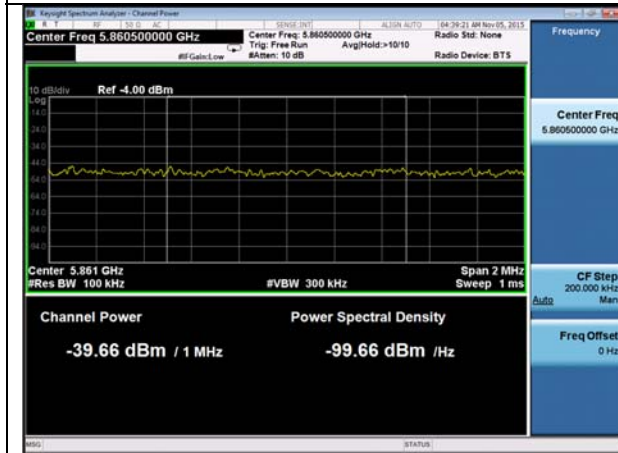
5.8GHz band: (20MHz offset)



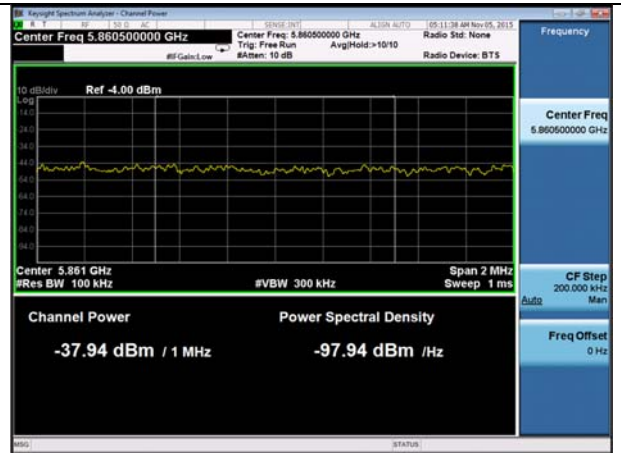
Band Edge -802.11a-5745M-chain0



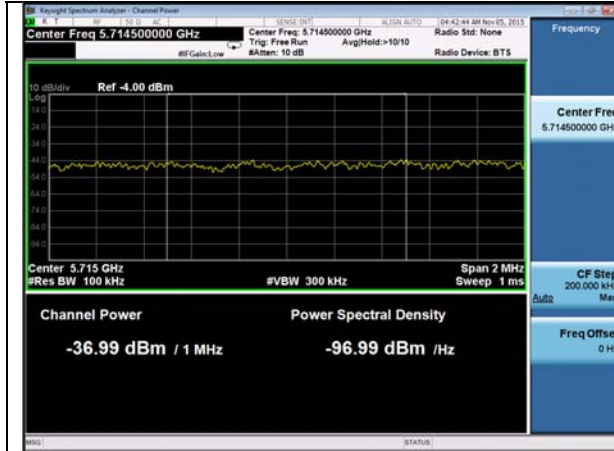
Band Edge -802.11a-5745M-chain1



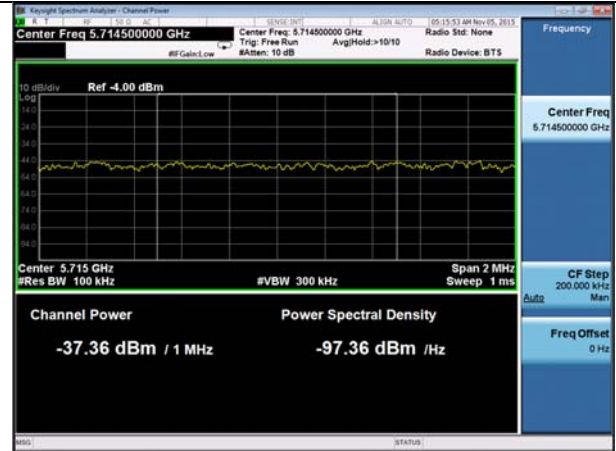
Band Edge -802.11a-5785M-chain0



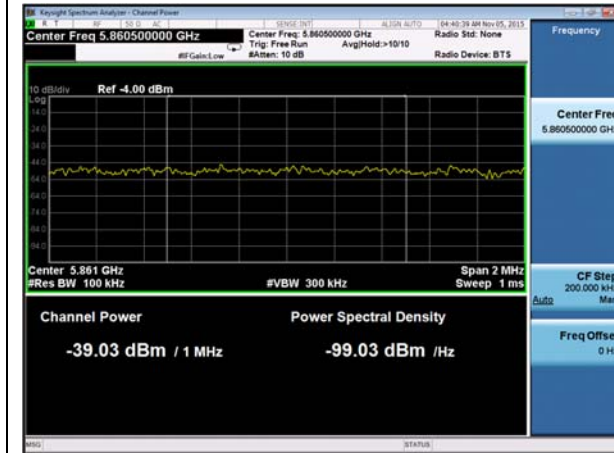
Band Edge -802.11a-5785M-chain1



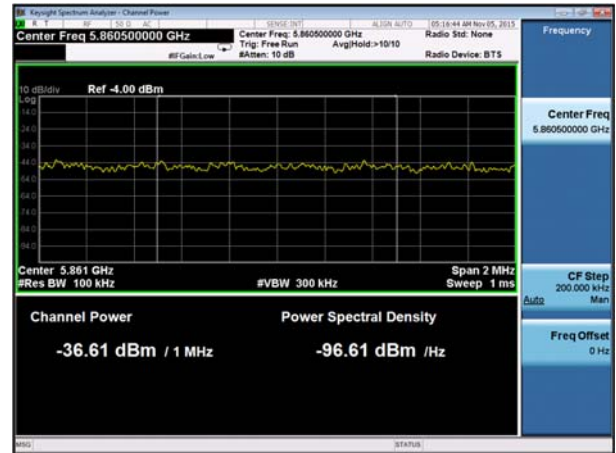
Band Edge -802.11n-20M -5745M-chain0



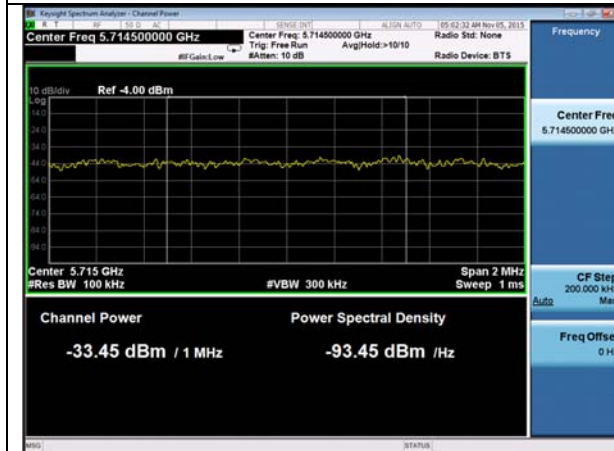
Band Edge -802.11n-20M -5745M-chain1



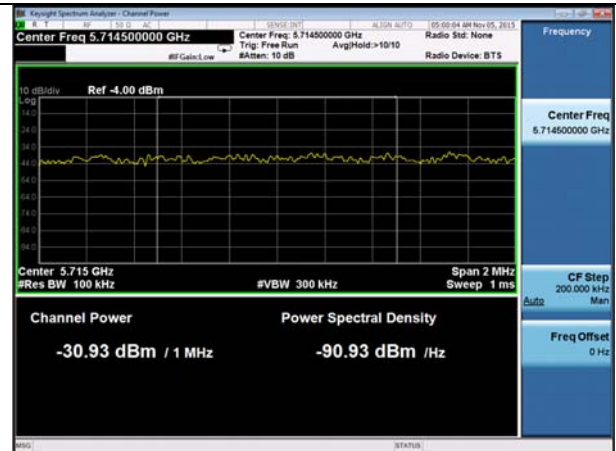
Band Edge -802.11n-20M -5825M-chain0



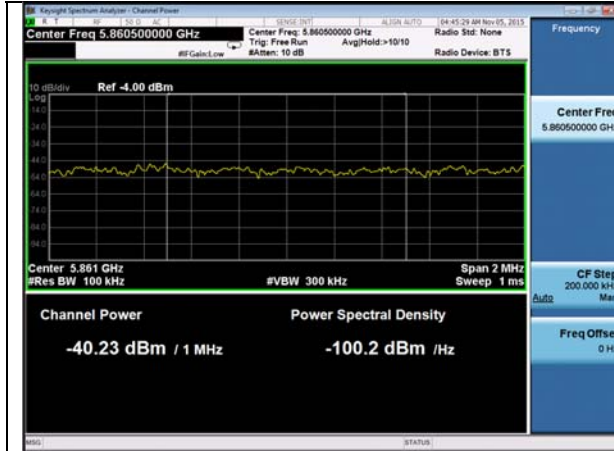
Band Edge -802.11n-20M -5825M-chain1



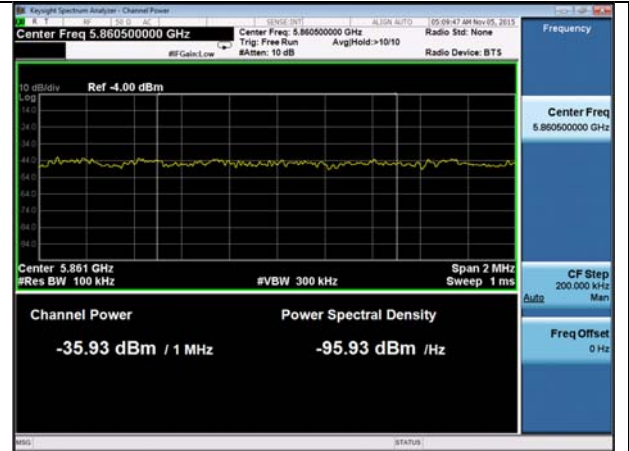
Band Edge -802.11n-40M -5755M-chain0



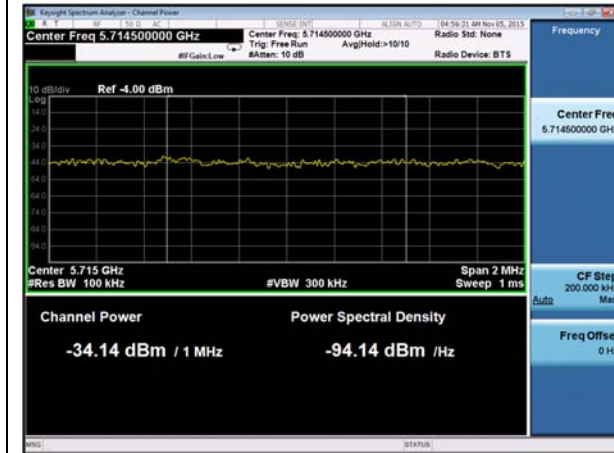
Band Edge -802.11n-40M -5755M-chain1



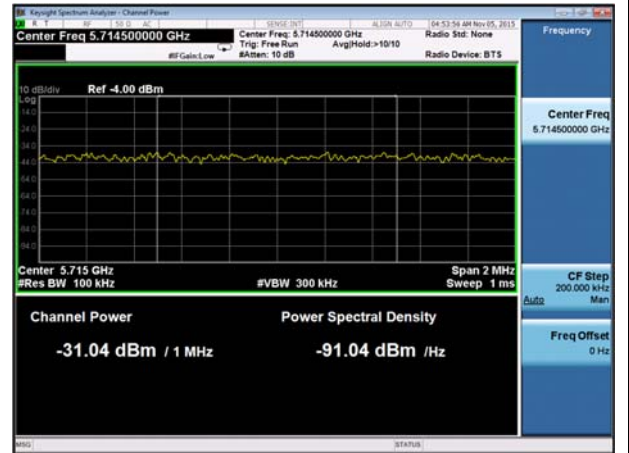
Band Edge -802.11n-40M-5795M-chain0



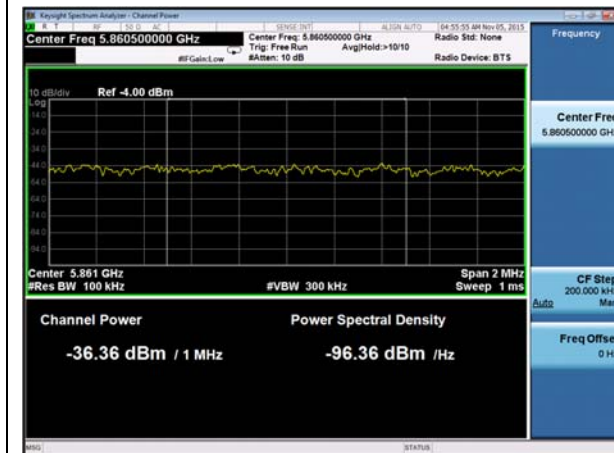
Band Edge -802.11n-40M-5795M-chain1



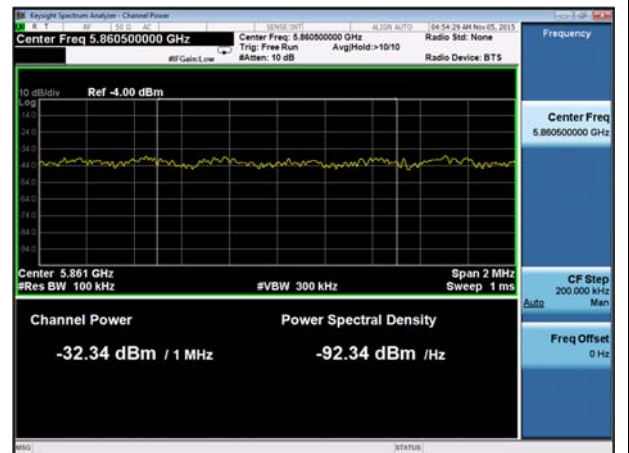
Band Edge -802.11ac-80M-5775M-chain0 (Left)



Band Edge -802.11ac-80M-5775M-chain1 (Left)



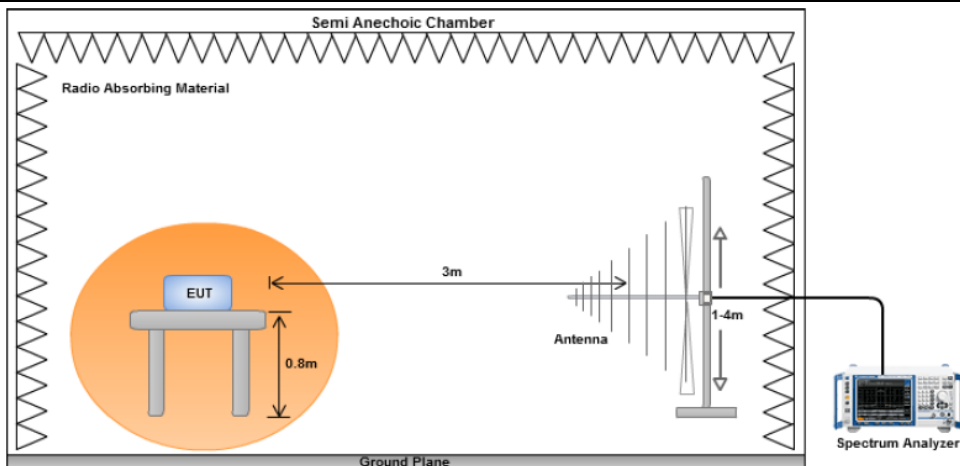
Band Edge -802.11ac-80M-5775M-chain0 (Right)



Band Edge -802.11ac-80M-5775M-chain1 (Right)

10.6 Radiated Emissions below 1GHz

Requirement(s):

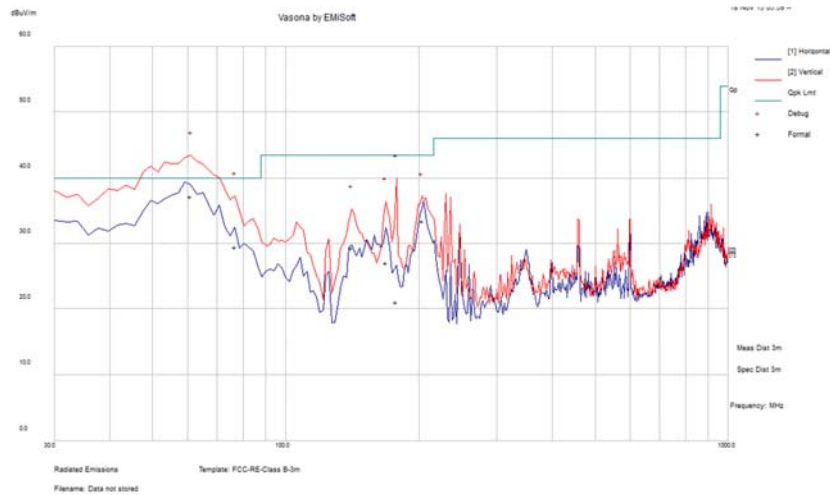
Spec	Requirement	Applicable										
47CFR§ 15.407(b) 15.209 (a)	Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges <table><tr><th>Frequency range (MHz)</th><th>Field Strength (uV/m)</th></tr><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></table>	Frequency range (MHz)	Field Strength (uV/m)	30 – 88	100	88 – 216	150	216 960	200	Above 960	500	☒
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

Radiated Emission Test Results (Below 1GHz)

Test specification	below 1GHz			
Environmental Conditions:	Temp (°C):	26	Result	Pass
	Humidity (%)	47		
	Atmospheric (mbar):	1020		
Mains Power:	120VAC, 60Hz			
Tested by:	Gary Chou			
Test Date:	11/17/2015			
Remarks:	Worst case, 802.11n HT40, 5795MHz			



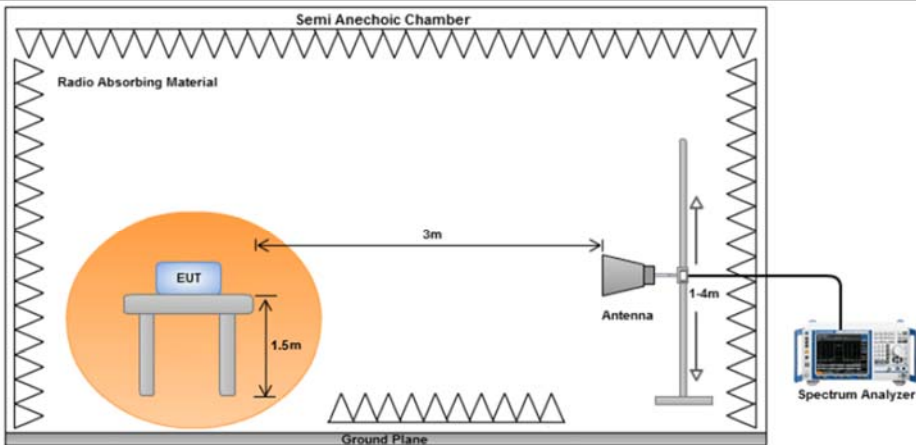
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Po I	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
60.90	66.29	1.16	-30.25	37.2	Quasi Max	V	100	282	40	-2.8	Pass
76.65	58.56	1.38	-30.45	29.5	Quasi Max	V	100	91	40	-10.5	Pass
177.67	46.39	2.24	-27.61	21.02	Quasi Max	V	100	112	43.52	-22.5	Pass
203.17	57.24	2.43	-26.24	33.44	Quasi Max	V	100	102	43.52	-10.08	Pass
168.23	51.93	2.15	-27.03	27.04	Quasi Max	V	100	107	43.52	-16.48	Pass
140.92	52.73	1.94	-25.27	29.41	Quasi Max	V	100	136	43.52	-14.11	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):

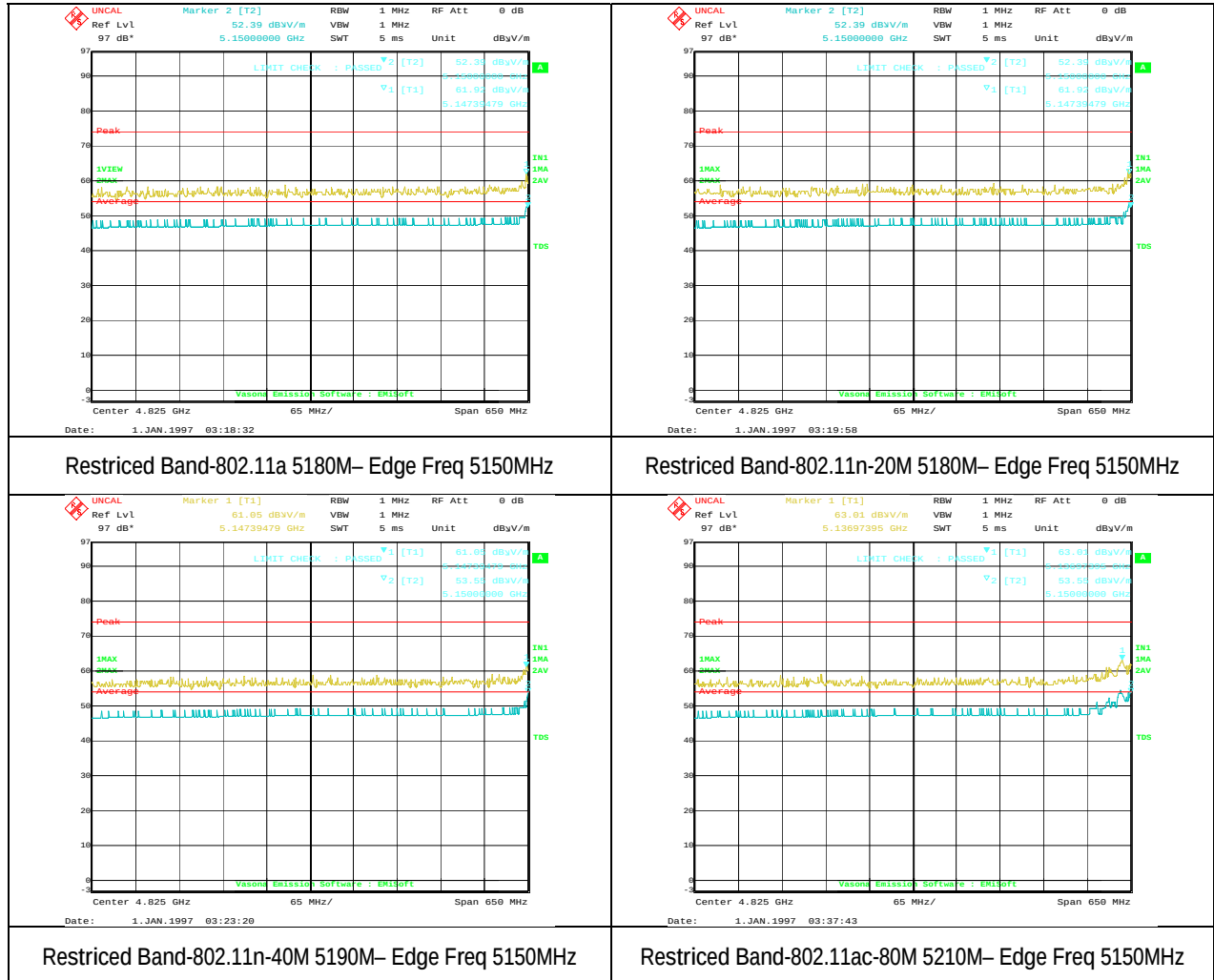
Spec	Item	Requirement	Applicable
47CFR§ 15.407(b)(2), 15.407(b)(6)	(1)	For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.	☒
	(2)	For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 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.	☐
	(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.	☐
	(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.	☒
	(5)	Restricted band, emission must also comply with the radiated emission limits specified in 15.209	☒

Test Setup	
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Procedure	- The EUT was switched on and allowed to warm up to its normal operating condition. - 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: - Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. - The EUT was then rotated to the direction that gave the maximum emission. - Finally, the antenna height was adjusted to the height that gave the maximum emission. - An average measurement was then made for that frequency point. - 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 40GHz. 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

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
4208.54	37.84	9.02	14.84	61.71	Peak Max	H	209	62	74	-12.29	Pass
1998.09	40.18	4.28	14.99	59.44	Peak Max	H	144	270	74	-14.56	Pass
4208.54	25.65	9.02	14.84	49.52	Average Max	H	209	62	54	-4.48	Pass
1998.09	28.11	4.28	14.99	47.37	Average Max	H	144	270	54	-6.63	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
6014.26	36.55	10.5	14.56	61.6	Peak Max	V	128	5	74	-12.4	Pass
1997.30	39.77	4.28	14.98	59.03	Peak Max	V	221	56	74	-14.97	Pass
6014.26	24.44	10.5	14.56	49.49	Average Max	V	128	5	54	-4.51	Pass
1997.30	27.75	4.28	14.98	47.01	Average Max	V	221	56	54	-6.99	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
6112.47	36.91	10.62	14.32	61.85	Peak Max	V	199	194	74	-12.15	Pass
2020.18	39.21	4.3	14.93	58.45	Peak Max	H	130	33	74	-15.55	Pass
6112.47	24.74	10.62	14.32	49.68	Average Max	V	199	194	54	-4.32	Pass
2020.18	27.57	4.3	14.93	46.8	Average Max	H	130	33	54	-7.2	Pass

1GHz-40GHz – 802.11n-20M – 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
1732.75	29.14	4.14	12.9	46.18	Peak Max	V	112	341	74	-27.82	Pass
4008.27	33.05	8.52	15.71	57.28	Peak Max	V	234	204	74	-16.72	Pass
1732.75	17.62	4.14	12.9	34.66	Average Max	V	112	341	54	-19.34	Pass
4008.27	21.68	8.52	15.71	45.91	Average Max	V	234	204	54	-8.09	Pass

1GHz-40GHz – 802.11n-20M – 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
6048.25	32.78	10.54	14.47	57.79	Peak Max	V	142	133	74	-16.21	Pass
3792.02	34.92	7.36	14.99	57.27	Peak Max	V	212	9	74	-16.73	Pass
6048.25	21.02	10.54	14.47	46.03	Average Max	V	142	133	54	-7.97	Pass
3792.02	23.29	7.36	14.99	45.64	Average Max	V	212	9	54	-8.36	Pass

1GHz-40GHz – 802.11n-20M – 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
6236.67	33.21	10.77	14.02	58.01	Peak Max	H	230	161	74	-15.99	Pass
7220.03	33.08	9.91	11.42	54.41	Peak Max	V	241	311	74	-19.59	Pass
6236.67	21.26	10.77	14.02	46.06	Average Max	H	230	161	54	-7.95	Pass
7220.03	21.65	9.91	11.42	42.98	Average Max	V	241	311	54	-11.02	Pass

1GHz-40GHz – 802.11n-40M – 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
4080.60	33.57	8.7	15.39	57.67	Peak Max	H	135	143	74	-16.33	Pass
1859.05	30.35	4.21	13.86	48.42	Peak Max	H	192	272	74	-25.58	Pass
4080.60	21.92	8.7	15.39	46.02	Average Max	H	135	143	54	-7.98	Pass
1859.05	18.17	4.21	13.86	36.24	Average Max	H	192	272	54	-17.76	Pass

1GHz-40GHz – 802.11n-40M – 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
5027.86	34.22	10.57	13.02	57.81	Peak Max	H	108	334	74	-16.19	Pass
3879.23	34.55	7.85	15.31	57.71	Peak Max	V	200	84	74	-16.29	Pass
5027.86	21.58	10.57	13.02	45.17	Average Max	H	108	334	54	-8.83	Pass
3879.23	23.06	7.85	15.31	46.22	Average Max	V	200	84	54	-7.78	Pass

1GHz-40GHz – 802.11ac-80M – 5210MHz

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
6035.48	32.87	10.52	14.5	57.9	Peak Max	H	145	123	74	-16.1	Pass
3901.08	34.37	7.97	15.39	57.73	Peak Max	V	108	231	74	-16.27	Pass
6035.48	21.15	10.52	14.5	46.18	Average Max	H	145	123	54	-7.82	Pass
3901.08	22.8	7.97	15.39	46.16	Average Max	V	108	231	54	-7.85	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
4188.46	37.05	8.97	14.93	60.96	Peak Max	V	135	64	74	-13.05	Pass
6154.51	36.08	10.67	14.22	60.97	Peak Max	H	227	177	74	-13.03	Pass
4188.46	25.75	8.97	14.93	49.65	Average Max	V	135	64	54	-4.35	Pass
6154.51	24.69	10.67	14.22	49.58	Average Max	H	227	177	54	-4.43	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
4080.68	37.13	8.71	15.39	61.23	Peak Max	H	246	106	74	-12.77	Pass
6131.99	36.35	10.65	14.27	61.26	Peak Max	H	205	2	74	-12.74	Pass
4080.68	25.86	8.71	15.39	49.95	Average Max	H	246	106	54	-4.05	Pass
6131.99	24.68	10.65	14.27	49.6	Average Max	H	205	2	54	-4.4	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
4240.26	37.32	9.1	14.71	61.13	Peak Max	H	162	129	74	-12.87	Pass
6172.90	36.85	10.7	14.17	61.72	Peak Max	V	154	337	74	-12.28	Pass
4240.26	25.64	9.1	14.71	49.45	Average Max	H	162	129	54	-4.55	Pass
6172.90	24.35	10.7	14.17	49.22	Average Max	V	154	337	54	-4.78	Pass

1GHz-40GHz – 802.11n-20M – 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
4133.03	37.76	8.84	15.17	61.76	Peak Max	V	112	164	74	-12.24	Pass
6130.43	36.66	10.64	14.27	61.58	Peak Max	V	142	359	74	-12.42	Pass
4133.03	25.99	8.84	15.17	50	Average Max	V	112	164	54	-4.01	Pass
6130.43	24.66	10.64	14.27	49.58	Average Max	V	142	359	54	-4.42	Pass

1GHz-40GHz - 802.11n-20M– 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
4058.81	37.1	8.65	15.49	61.24	Peak Max	H	244	122	74	-12.76	Pass
2063.30	39.8	4.34	14.8	58.93	Peak Max	V	146	26	74	-15.07	Pass
4058.81	25.68	8.65	15.49	49.82	Average Max	H	244	122	54	-4.18	Pass
2063.30	28.46	4.34	14.8	47.6	Average Max	V	146	26	54	-6.4	Pass

1GHz-40GHz - 802.11n-20M - 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
4081.97	38.3	8.71	15.39	62.4	Peak Max	H	233	278	74	-11.6	Pass
6013.19	35.96	10.5	14.56	61.02	Peak Max	V	175	222	74	-12.98	Pass
4081.97	25.88	8.71	15.39	49.97	Average Max	H	233	278	54	-4.03	Pass
6013.19	24.42	10.5	14.56	49.47	Average Max	V	175	222	54	-4.53	Pass

1GHz-40GHz – 802.11n-40M – 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
4089.93	37.59	8.73	15.35	61.67	Peak Max	V	155	252	74	-12.33	Pass
6225.77	36.62	10.76	14.05	61.43	Peak Max	V	204	228	74	-12.57	Pass
4089.93	25.9	8.73	15.35	49.98	Average Max	V	155	252	54	-4.02	Pass
6225.77	24.5	10.76	14.05	49.31	Average Max	V	204	228	54	-4.69	Pass

1GHz-40GHz - 802.11n-40M– 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
6119.89	36.79	10.63	14.3	61.72	Peak Max	H	176	298	74	-12.28	Pass
4090.22	37.77	8.73	15.35	61.85	Peak Max	H	251	94	74	-12.15	Pass
6119.89	24.63	10.63	14.3	49.56	Average Max	H	176	298	54	-4.44	Pass
4090.22	26.05	8.73	15.35	50.14	Average Max	H	251	94	54	-3.87	Pass

1GHz-40GHz - 802.11ac-80M - 5775MHz

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
4188.54	37.56	8.97	14.93	61.46	Peak Max	H	125	160	74	-12.54	Pass
6217.21	36.49	10.75	14.07	61.31	Peak Max	V	225	251	74	-12.69	Pass
4188.54	25.7	8.97	14.93	49.6	Average Max	H	125	160	54	-4.4	Pass
6217.21	24.53	10.75	14.07	49.35	Average Max	V	225	251	54	-4.65	Pass

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Conducted Emissions						
R & S Receiver	ESIB 40	100179	05/23/2015	1 Year	05/23/2016	☒
CHASE LISN	MN2050B	1018	08/07/2015	1 Year	08/07/2016	☒
Radiated Emissions						
R & S Receiver	ESL6	100178	05/27/2015	1 Year	05/27/2016	☒
R & S Receiver	ESIB 40	100179	05/23/2015	1 Year	05/23/2016	☒
ETS-Lingren Loop Antenna	6512	00049120	05/12/2015	1 Year	05/12/2016	☒
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	08/12/2015	1 Year	08/12/2016	☒
3 Meters SAC	3M	N/A	08/08/2015	1 Year	08/08/2016	☒
10 Meters SAC	10M	N/A	09/05/2015	1 Year	09/05/2016	☒
RF Conducted Measurement						
Spectrum Analyzer	N9010A	10SL0219	08/20/2015	1 Year	08/20/2016	☒
R & S Receiver	ESIB 40	100179	05/23/2015	1 Year	05/23/2016	☒
Test Equity Environment Chamber	1007H	61201	07/31/2015	1 Year	07/31/2016	☒
USB RF Power Sensor	7002-006	10SL0190	09/03/2015	1 Year	09/03/2016	☒

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