



Regulatory Test Report

Prepared for Harman International Industries, Inc.

This report presents detailed information on

R1 INT NA 3B HW4

Prepared by

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Engineer II

Approved by

Jason Kanakry

General Manager

Issue date: 01/17/2025

Report No: J23133-R1 INT NA 3B HW4-TR2 v2

This test result relates only to the described test object.

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Customer must not use this test report as the product certification of each accreditation body or each national organization.

The test is traceable to national standard or related international standard

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1. TEST REQUEST INFORMATION

Test Request #:	7700206789
Test Requested By:	Pranav Patel Harman International Industries, Inc. 30001 Cabot Drive, Novi, MI 48377
Test item Description:	R1 INT NA 3B HW4
Part Number:	P68581660ZZ
DUT Sample Number:	J23133#2 NA 3B
FVIN :	FCA-MY24.MNL-OD.3426
Hardware Version of DUT:	N/A
Software Version of DUT:	N/A
Component Category of DUT:	N/A
FCC ID:	2AHPN-BE2878
ISED ID:	6434C-BE2878
Type of Test:	FCC/ISED Certification
Test Method:	CFR Title 47 FCC Part 15.407, ISED Canada RSS-247 Issue 3, ISED Canada RSS-Gen Issue 5, FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01 and ANSI C63.10-2013
Deviations from standard:	None
Approved Test Plan Number:	N/A
Test Plan Revision:	N/A
Date Test Sample Received:	06-26-2024
Date Test Started:	09-27-2024
Date Test Finished:	10-16-2024

2. TEST LABORATORY INFORMATION

Location of Test Lab:	The radiated and conducted emissions test sites are located at Bureau Veritas 815 N. Opdyke Rd #100, Auburn Hills, MI 48326, Phone: +1-248-836-4700
Key Contact:	Jason Kanakry (General Manager) Jason.Kanakry@BureauVeritas.com Phone: +1-248-836-4747
Laboratory Accreditations:	BUREAU VERITAS CONSUMER PRODUCTS SERVICES, INC is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories.
ISO/IEC 17025:2017:	5678.01
FCC Test Site Number:	US1278 (242530)
IC Test Site Number:	US0229 (26240)

3. STATEMENT OF CONFORMITY

RSS-GEN	RSS 247	Part 15	Comments
6.4		15.15(b)	There are no controls accessible to the user that varies the output power to operate in violation of the regulatory requirements.
		15.19	The label shown in the label exhibit.
		15.21	Information to the user shown in the instruction manual exhibit.
		15.27	No special accessories are required for compliance.
3.2		15.31	The EUT tested in accordance with the measurement standards in this section.
6.13.2		15.33	Frequency range investigated according to this section, unless noted in specific rule section under which the equipment operates.
6.13.1		15.35	The EUT emissions are measured using the measurement detector and bandwidth specified in this section, unless noted in specific rule section under which the equipment operates.
6.8		15.203	EUT employs integrated PCB antenna with 2.67dBi (UNII-1) and 1.52dBi (UNII-3)
8.10		15.205 15.209	The fundamental is not in a Restricted band and the spurious and harmonic emissions in the Restricted bands comply with the general emission limits of 15.209 or RSS-Gen as applicable
8.8		15.207	N/A. EUT is vehicle battery powered only.

4. CONDUCTED TESTING

4.1 Test Summary

This test report supports an application for certification of a transmitter operating pursuant to:

CFR Title 47 FCC Part 15.407, ISED Canada RSS-247 Issue 3, ISED Canada RSS-Gen Issue 5, FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01 and ANSI C63.10-2013

The product is **R1 INT NA 3B HW4** transmitter that operates in UNII-1 (5.15GHz – 5.25GHz) and UNII-3 (5.725GHz – 5.85GHz)

Details	Description
Frequency Range (MHz)	UNII-1 (5.15GHz – 5.25GHz) UNII-3 (5.725GHz – 5.85GHz)
Tested Modes	802.11a 802.11n(HT20, HT40) 802.11ac (VHT20, VHT40, VHT80).
Tested Channels	UNII-1 (36-48) UNII-3 (149-165)
DUT Antenna Type	Integrated PCB antenna
Number of transmit chains	1
Equipment Type	Unlicensed National Information Infrastructure Device
DUT Antenna Gain	2.67dBi (UNII-1) 1.52dBi (UNII-3) ☒ Provided by Customer with Gain Report ☐ Not Provided by Customer
DUT/EUT Operation	EUT is configured/programmed by an External Test Laptop with USB and Ethernet interfaces to set WLAN Test Mode, data rates, channels, bandwidth, band configurations etc., using labtool (MFGBridge_Tool).

Test samples received in good condition. We found that the product met the above requirements with modification.

Test Item	Sample #	Result
FCC 15.407 UNII-1	J23133#2 NA 3B	Meets Requirements
FCC 15.407 UNII-3	J23133#2 NA 3B	Meets Requirements

Worst-case emission obtained on low data rates, so Full Testing performed on lowest data rate.

UNII-1 Test Results Summary

Test	Frequency (MHz)	802.11a	802.11n(HT20)	802.11ac (VHT20)
RF Output Power	5180/5200/5240	PASS	PASS	PASS
Power Spectral Density	5180/5200/5240	PASS	PASS	PASS
DTS Bandwidth (6dB)	5180/5200/5240	PASS	PASS	PASS
Occupied Channel Bandwidth 99%	5180/5200/5240	PASS	PASS	PASS
		802.11n(HT40)		802.11ac(VHT40)
RF Output Power	5190/5230	PASS	PASS	
Power Spectral Density	5190/5230	PASS	PASS	
DTS Bandwidth (6dB)	5190/5230	PASS	PASS	
Occupied Channel Bandwidth 99%	5190/5230	PASS	PASS	
		802.11ac(VHT80)		
RF Output Power	5210	PASS		
Power Spectral Density	5210	PASS		
DTS Bandwidth (6dB)	5210	PASS		
Occupied Channel Bandwidth 99%	5210	PASS		

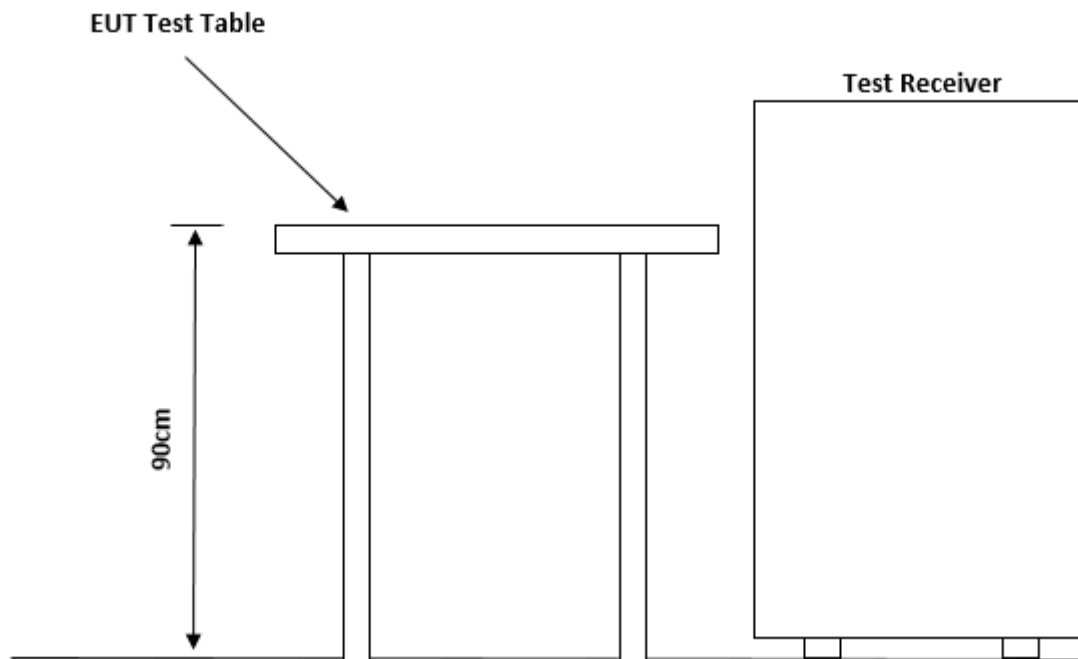
UNII-3 Test Results Summary

Test	Frequency (MHz)	802.11a	802.11n(HT20)	802.11ac (VHT20)
RF Output Power	5745/5785/5825	PASS	PASS	PASS
Power Spectral Density	5745/5785/5825	PASS	PASS	PASS
DTS Bandwidth (6dB)	5745/5785/5825	PASS	PASS	PASS
Occupied Channel Bandwidth 99%	5745/5785/5825	PASS	PASS	PASS
		802.11n(HT40)		802.11ac(VHT40)
RF Output Power	5755/5795	PASS	PASS	
Power Spectral Density	5755/5795	PASS	PASS	
DTS Bandwidth (6dB)	5755/5795	PASS	PASS	
Occupied Channel Bandwidth 99%	5755/5795	PASS	PASS	
		802.11ac(VHT80)		
RF Output Power	5775	PASS		
Power Spectral Density	5775	PASS		
DTS Bandwidth (6dB)	5775	PASS		
Occupied Channel Bandwidth 99%	5775	PASS		

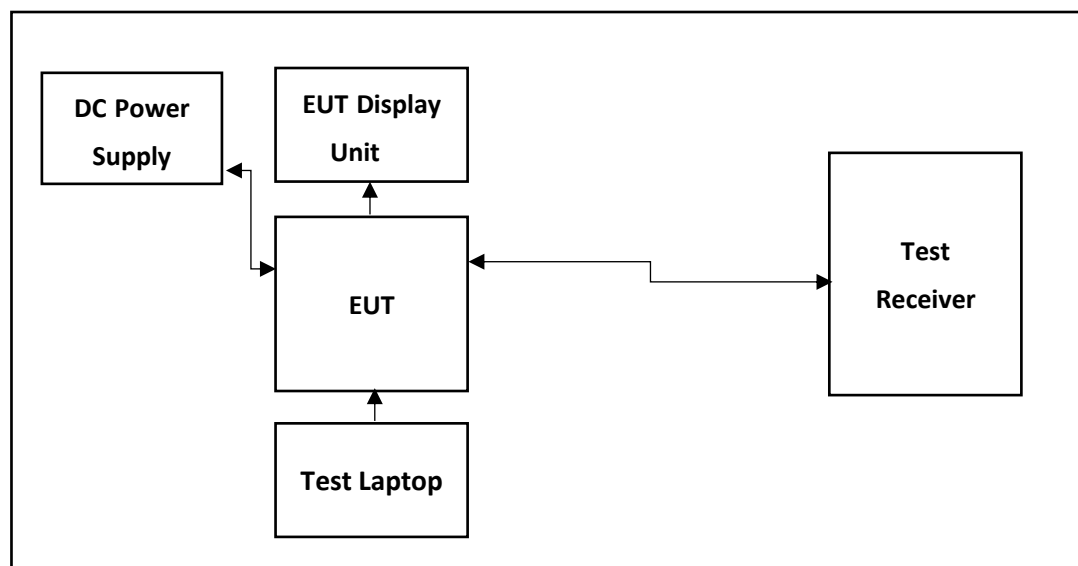
4.2 Test Setup

Conducted Test Site Description

Test site is accommodated with test tabletop and floor standing test equipment.



TEST SETUP DIAGRAM



4.3 Test Equipment Used

ID #	Equipment	Manufacturer	Model #	Serial #	Cal Due
BVD0226	Spectrum Analyzer 10Hz-44GHz	Rohde & Schwarz	FSV3044	101018	4/20/2025
BVD0227	8 port switch unit for Wireless Test system	Rohde & Schwarz	OSP150	101100	11/24/2025
BVD0228	8 port switch unit for Wireless Test system	Rohde & Schwarz	OSP220	101632	11/14/2025
BVD0224	Signal Generator 100kHz-40GHz	Rohde & Schwarz	SMB100A	181741	4/20/2025
BVD0225	Signal Generator 100k-6GHz with GPS simulator	Rohde & Schwarz	SMW200A	107664	4/20/2025
BVD0250	Wireless Connectivity Tester 70M-6GHz	Rohde & Schwarz	CMW270	102113	4/20/2025
BVD0302	DC power supply 1-15VDC 60A 110/220 11.5A max input	BK Precision	1693	257F17180	N/A
BVD0321	Fixed Attenuator 2W 20dB -40GHz	Mini-Circuits	BW-K20-2W44+	2103	12/11/2024
BVD0430	Multimeter	Fluke	117	49710262SV	11/17/2024
BVD0229	Temp and Humidity Meter	Fluke	971	12001009	5/23/2025
N/A	Test-PC	Lenovo ThinkPad	E480	SL10Q37355	N/A

Notes: - DC power supply verified before use with calibrated Multimeter.

Customer Supplied Equipment

ID #	Equipment	Manufacturer	Model	Serial #	Version No.
N/A	Harness	Harman	N/A	N/A	N/A
N/A	Display Unit	MOBIS	BMM6100000	231107 01	N/A
N/A	Shark Fin Antenna	Alfa Romeo	B901	719147	N/A
N/A	Antenna	Aptiv	APN35409682	N/A	N/A
N/A	Camera	N/A	23295906C	N/A	N/A
N/A	MFGBridge_Tool/ Dut labtool	N/A	N/A	N/A	2.0.0.89

Equipment List (Software)

ID #	Equipment	Manufacturer	Model	Version No	
N/A	EMC Test Software	Rodhe & Schwarz	EMC32	11.20.00	N/A

4.4 UNII-1

Mode	Channel	Frequency
802.11a 802.11n(HT20) 802.11ac(VHT20)	36	5180
802.11n(HT40) 802.11ac(VHT40)	38	5190
802.11a 802.11n(HT20) 802.11ac(VHT20)	40	5200
802.11ac(VHT80)	42	5210
802.11n(HT40) 802.11ac(VHT40)	46	5230
802.11a 802.11n(HT20) 802.11ac(VHT20)	48	5240

Notes: Channels and modes above were tested.

Power settings

802.11a		802.11n (HT20)		802.11ac (VHT20)	
Channel	Power Setting	Channel	Power Setting	Channel	Power Setting
36	5	36	5	36	5
40	5	40	5	40	5
48	5	48	5	48	5

802.11n (HT40)		802.11ac (VHT40)	
Channel	Power Setting	Channel	Power Setting
38	5	38	5
46	5	46	5

802.11ac (VHT80)	
Channel	Power Setting
42	4

4.4.1 RF output power

FCC

Test according to FCC title 47 part 15 §15.407(a), KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 II.E and ANSI C63.10-2013 (In Reference to KDB 789033 E.3.B). Measurement uncertainty calculated in accordance with ETSI TR 100 028-1.

Expanded Combined Uncertainty of absolute Level Measurement (K=2) < 1 dB

Device has both client and access point modes and has identical RF characteristics and settings for both Limits are as follows:

15.407(a)(1)(i): 1W (30dBm) for outdoor access points with antenna gains less than 6dBi.

15.407(a)(1)(iv): 250mW (23.9dBm) for client devices with antenna gains less than 6dBi.

Since client devices are subject to more stringent limits, unit was tested against the limits for a client device.

802.11a

Data Rate	Gated RMS with TPC (dBm) 5180MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	Power Setting (dBm)
6 Mbps	3.301	2.67	5.971	21.0	5
Data Rate	Gated RMS (dBm) 5200MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	
6 Mbps	3.156	2.67	5.826	21.0	5
Data Rate	Gated RMS (dBm) 5240MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	
6 Mbps	2.863	2.67	5.533	21.0	5

802.11n (HT20)

Data Rate	Gated RMS (dBm) 5180MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	Power Setting (dBm)
MCS0	3.234	2.67	5.904	21.0	5
Data Rate	Gated RMS (dBm) 5200MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	
MCS0	3.201	2.67	5.871	21.0	5
Data Rate	Gated RMS (dBm) 5240MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	
MCS0	2.916	2.67	5.586	21.0	5

802.11ac (VHT20)

Data Rate	Gated RMS (dBm) 5180MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	Power Setting (dBm)
MCS0	2.969	2.67	5.639	21.0	5
Data Rate	Gated RMS (dBm) 5200MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	
MCS0	2.987	2.67	5.657	21.0	5
Data Rate	Gated RMS (dBm) 5240MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	
MCS0	2.705	2.67	5.375	21.0	5

802.11n (HT40)

Data Rate	Gated RMS (dBm) 5190MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	Power Setting (dBm)
MCS0	2.705	2.67	5.375	21.0	5
Data Rate	Gated RMS (dBm) 5230MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	
MCS0	2.701	2.67	5.371	21.0	5

802.11ac (VHT40)

Data Rate	Gated RMS (dBm) 5190MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	Power Setting (dBm)
MCS0	2.780	2.67	5.45	21.0	5
Data Rate	Gated RMS (dBm) 5230MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	
MCS0	2.551	2.67	5.221	21.0	5

802.11ac (VHT80)

Data Rate	Gated RMS (dBm) 5210MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	Power Setting (dBm)
MCS0	2.762	2.67	5.432	21.0	4

RSS-247

Per RSS-247 Issue 2 Section 6.2.1.1, limit for OEM devices installed in vehicles: Maximum EIRP shall not exceed 30mW or $1.76+10*\log B$, dBm, whichever is less (where B is 99% OBW in MHz). In addition, devices must be capable of reducing power by at least 3dB below the maximum permitted EIRP of 30mW, which is 11.77dBm.

For modulations with less than 20MHz 99% OBW; 802.11a, 802.11n (HT20) and 802.11ac (VHT20), worst case 99% OBW of 16.600MHz is assumed with resulting conservative limit of 13.96dBm. For modulations with more than 20MHz 99% OBW; 802.11n (HT40), 802.11ac (VHT40) and 802.11ac (VHT80), the limit is 30mW (14.77dBm)

802.11a

Data Rate	Gated RMS with TPC (dBm) 5180MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	Power Setting (dBm)
6 Mbps	3.301	2.67	5.971	13.96	5
Data Rate	Gated RMS (dBm) 5200MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	
6 Mbps	3.156	2.67	5.826	13.96	5
Data Rate	Gated RMS (dBm) 5240MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	
6 Mbps	2.863	2.67	5.533	13.96	5

802.11n (HT20)

Data Rate	Gated RMS (dBm) 5180MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	Power Setting (dBm)
MCS0	3.234	2.67	5.904	13.96	5
Data Rate	Gated RMS (dBm) 5200MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	
MCS0	3.201	2.67	5.871	13.96	5
Data Rate	Gated RMS (dBm) 5240MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	
MCS0	2.916	2.67	5.586	13.96	5

802.11ac (VHT20)

Data Rate	Gated RMS (dBm) 5180MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	Power Setting (dBm)
MCS0	2.969	2.67	5.639	13.96	5
Data Rate	Gated RMS (dBm) 5200MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	
MCS0	2.987	2.67	5.657	13.96	5
Data Rate	Gated RMS (dBm) 5240MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	
MCS0	2.705	2.67	5.375	13.96	5

802.11n (HT40)

Data Rate	Gated RMS (dBm) 5190MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	Power Setting (dBm)
MCS0	2.705	2.67	5.375	14.77	5
Data Rate	Gated RMS (dBm) 5230MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	
MCS0	2.701	2.67	5.371	14.77	5

802.11ac (VHT40)

Data Rate	Gated RMS (dBm) 5190MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	Power Setting (dBm)
MCS0	2.780	2.67	5.45	14.77	5
Data Rate	Gated RMS (dBm) 5230MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	
MCS0	2.551	2.67	5.221	14.77	5

802.11ac (VHT80)

Data Rate	Gated RMS (dBm) 5210MHz	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	Power Setting (dBm)
MCS0	2.762	2.67	5.432	14.77	4

4.4.2 Power Spectral Density

Test according to FCC title 47 part 15 §15.407(a), KDB 789033 D02 General U-NII Test Procedures New

Rules v02r01 II.F with test method SA-1 and ANSI C63.10-2013.

Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 1.3 dB

FCC

Device has both client and access point modes and has identical RF characteristics and settings for both Limits are as follows:

15.407(a)(1)(i): 17dBm for outdoor access points with antenna gains less than 6dBi.

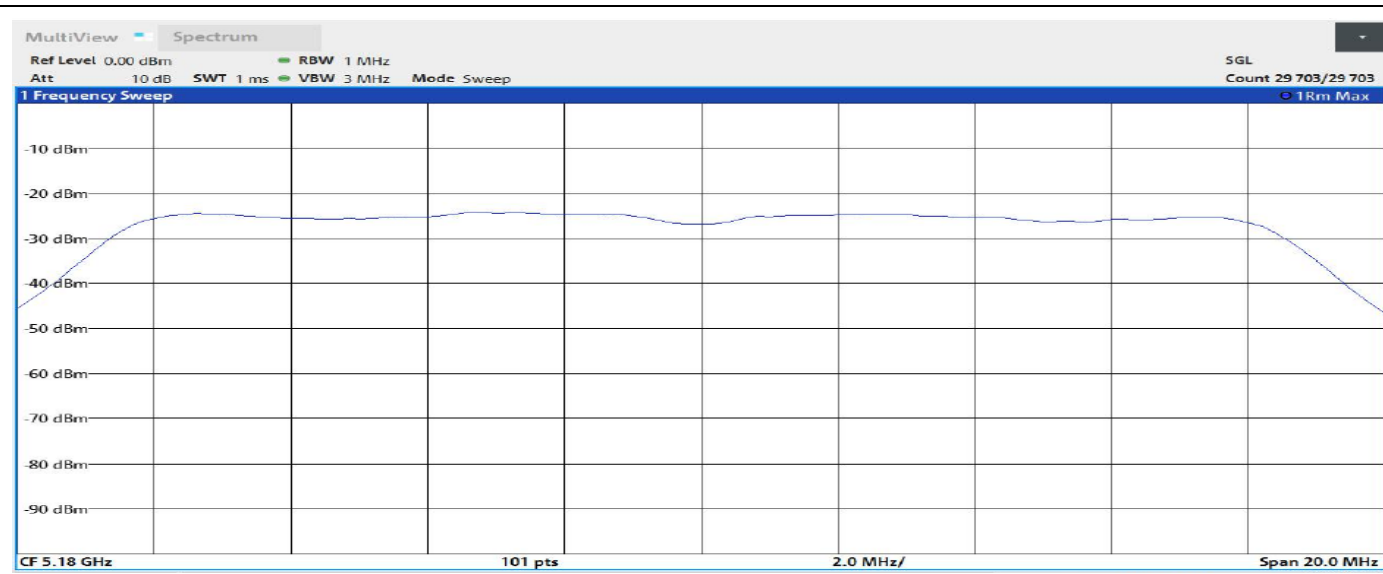
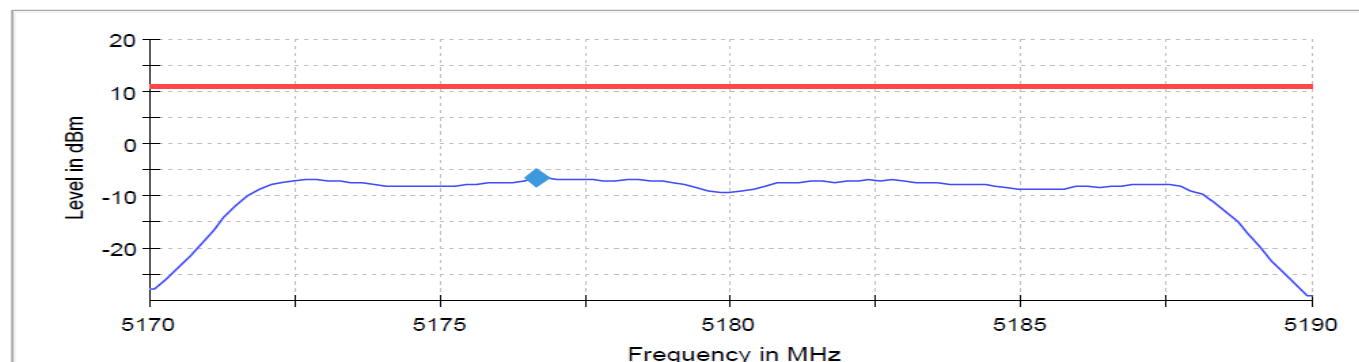
15.407(a)(1)(iv): 11dBm for client devices with antenna gains less than 6dBi.

Since client devices are subject to more stringent limits, unit tested against the limits for a client device.

Mode	Data Rate	PSD (dBm) 5180 MHz	PSD (dBm) 5200 MHz	PSD (dBm) 5240 MHz	Limit (dBm)	Power Setting (dBm)
802.11a	6Mbps	-6.575	-6.712	-7.235	11.0	5

802.11a 5180 MHz 6Mbps

Power Spectral Density



Mode	Data Rate	PSD (dBm) 5180 MHz	PSD (dBm) 5200 MHz	PSD (dBm) 5240 MHz	Limit (dBm)	Power Setting (dBm)
802.11n (HT20)	MCS0	-6.806	-6.754	-6.935	11.0	5

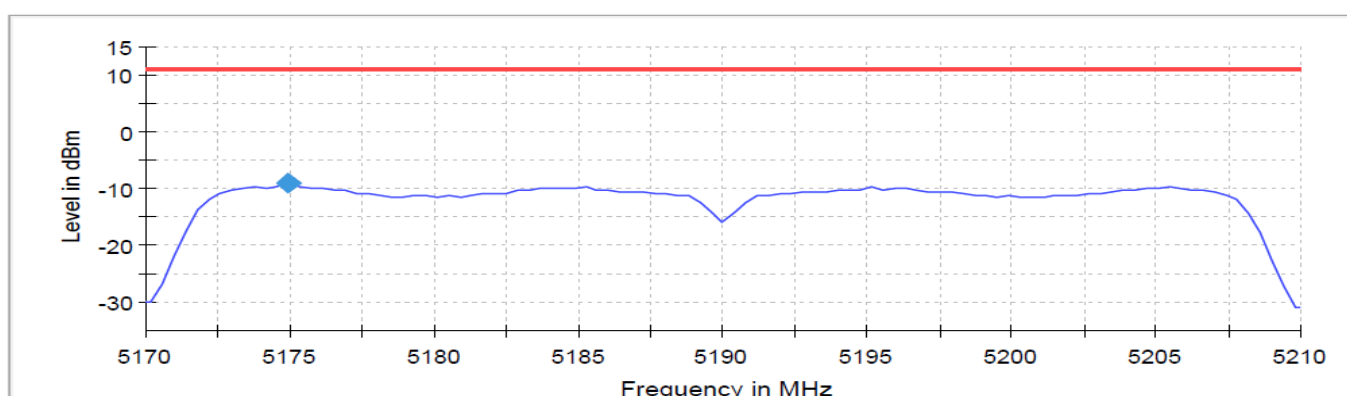
Mode	Data Rate	PSD (dBm) 5190 MHz	PSD (dBm) 5230 MHz	Limit (dBm)	Power Setting (dBm)
802.11n (HT40)	MCS0	-10.017	-10.261	11.0	5

Mode	Data Rate	PSD (dBm) 5180 MHz	PSD (dBm) 5200 MHz	PSD (dBm) 5240 MHz	Limit (dBm)	Power Setting (dBm)
802.11ac (VHT20)	MCS0	-6.783	-6.747	-7.070	11.0	5

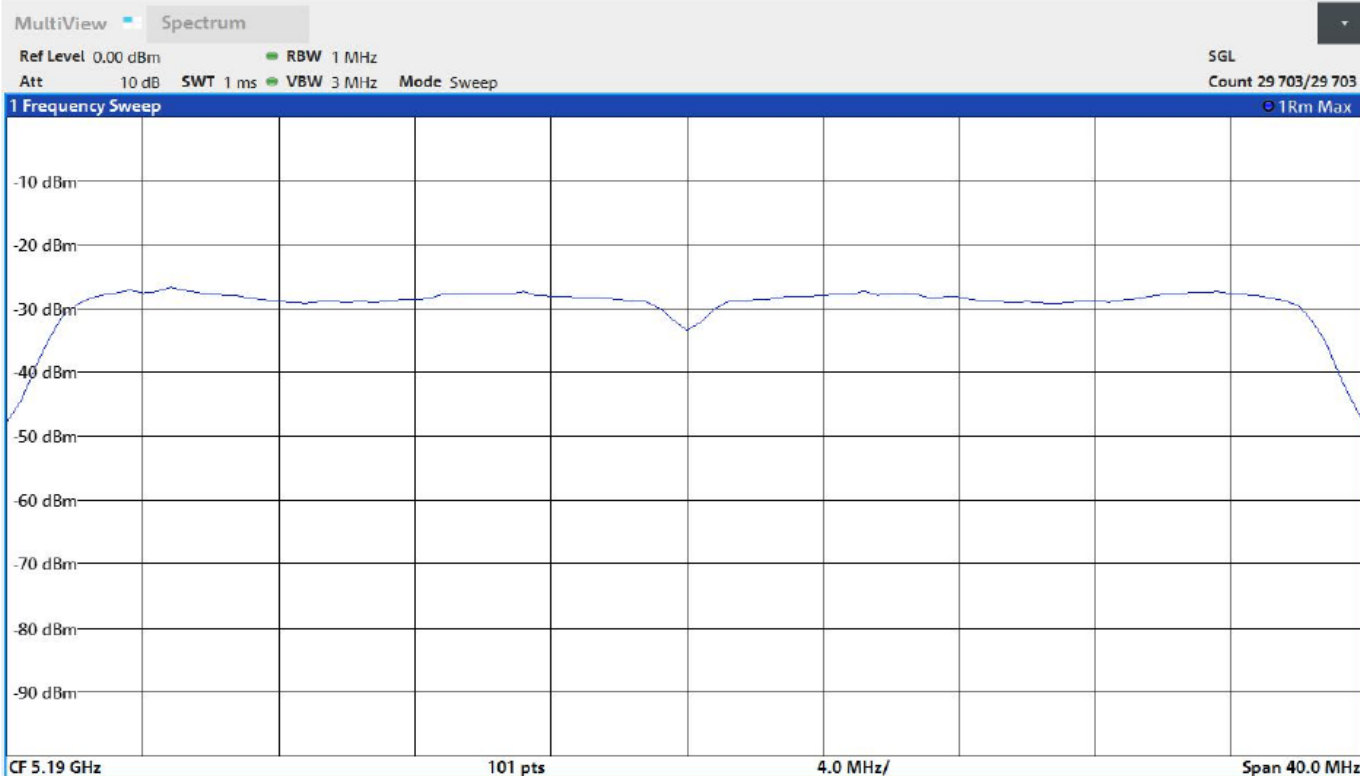
Mode	Data Rate	PSD (dBm) 5190 MHz	PSD (dBm) 5230 MHz	Limit (dBm)	Power Setting (dBm)
802.11ac (VHT40)	MCS0	-9.110	-9.857	11.0	5

802.11ac (VHT40) 5190 MHz MCS0

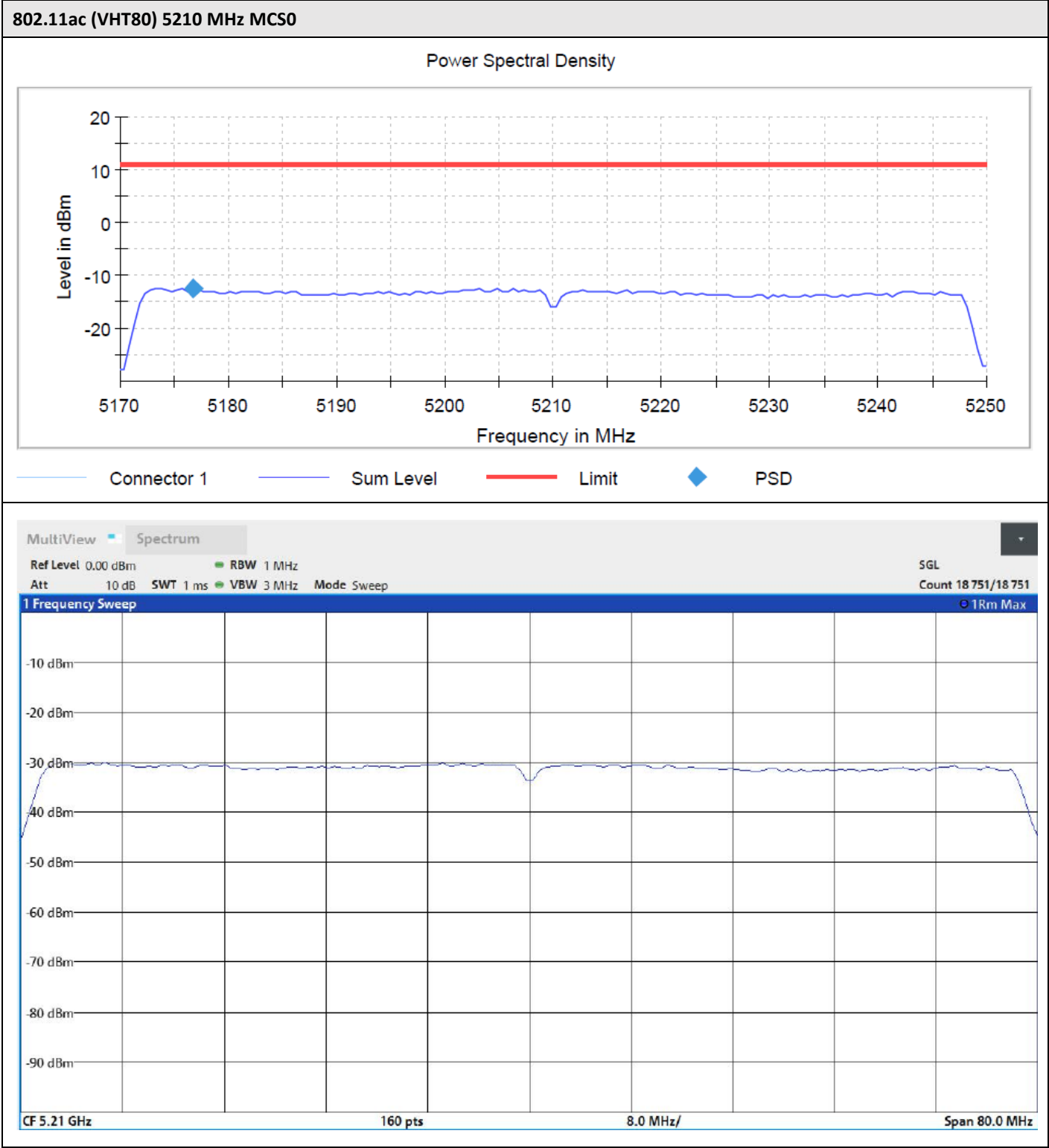
Power Spectral Density



Connector 1 Sum Level Limit PSD



Mode	Data Rate	PSD (dBm) 5210 MHz	Limit (dBm)	Power Setting (dBm)
802.11ac (VHT80)	MCS0	-12.352	11.0	5



RSS-247

802.11a

Data Rate	PSD(dBm) 5180MHz	Antenna Gain (dBi)	EIRP PSD (dBm)	Limit (dBm)	Power Setting (dBm)
6 Mbps	-6.575	2.67	-3.905	10.0	5
Data Rate	PSD(dBm) 5200MHz	Antenna Gain (dBi)	EIRP PSD (dBm)	Limit (dBm)	Power Setting (dBm)
6 Mbps	-6.712	2.67	-4.042	10.0	5
Data Rate	PSD(dBm) 5240MHz	Antenna Gain (dBi)	EIRP PSD (dBm)	Limit (dBm)	Power Setting (dBm)
6 Mbps	-7.235	2.67	-4.565	10.0	5

802.11n (HT20)

Data Rate	PSD(dBm) 5180MHz	Antenna Gain (dBi)	EIRP PSD (dBm)	Limit (dBm)	Power Setting (dBm)
MCS0	-6.806	2.67	-4.136	10.0	5
Data Rate	PSD(dBm) 5200MHz	Antenna Gain (dBi)	EIRP PSD (dBm)	Limit (dBm)	Power Setting (dBm)
MCS0	-6.754	2.67	-4.084	10.0	5
Data Rate	PSD(dBm) 5240MHz	Antenna Gain (dBi)	EIRP PSD (dBm)	Limit (dBm)	Power Setting (dBm)
MCS0	-6.935	2.67	-4.265	10.0	5

802.11n (HT40)

Data Rate	PSD(dBm) 5190MHz	Antenna Gain (dBi)	EIRP PSD (dBm)	Limit (dBm)	Power Setting (dBm)
MCS0	-10.017	2.67	-7.347	10.0	5
Data Rate	PSD(dBm) 5230MHz	Antenna Gain (dBi)	EIRP PSD (dBm)	Limit (dBm)	Power Setting (dBm)
MCS0	-10.261	2.67	-7.591	10.0	5

802.11ac (VHT20)

Data Rate	PSD(dBm) 5180MHz	Antenna Gain (dBi)	EIRP PSD (dBm)	Limit (dBm)	Power Setting (dBm)
MCS0	-6.783	2.67	-4.113	10.0	5
Data Rate	PSD(dBm) 5200MHz	Antenna Gain (dBi)	EIRP PSD (dBm)	Limit (dBm)	Power Setting (dBm)
MCS0	-6.747	2.67	-4.077	10.0	5
Data Rate	PSD(dBm) 5240MHz	Antenna Gain (dBi)	EIRP PSD (dBm)	Limit (dBm)	Power Setting (dBm)
MCS0	-7.070	2.67	-4.4	10.0	5

802.11ac (VHT40)

Data Rate	PSD(dBm) 5190MHz	Antenna Gain (dBi)	EIRP PSD (dBm)	Limit (dBm)	Power Setting (dBm)
MCS0	-9.110	2.67	-6.44	10.0	5
Data Rate	PSD(dBm) 5230MHz	Antenna Gain (dBi)	EIRP PSD (dBm)	Limit (dBm)	Power Setting (dBm)
MCS0	-9.857	2.67	-7.187	10.0	5

802.11ac (VHT80)

Data Rate	PSD(dBm) 5210MHz	Antenna Gain (dBi)	EIRP PSD (dBm)	Limit (dBm)	Power Setting (dBm)
MCS0	-12.352	2.67	-9.682	10.0	4

4.4.3 DTS Bandwidth 6dB

FCC and RSS-247

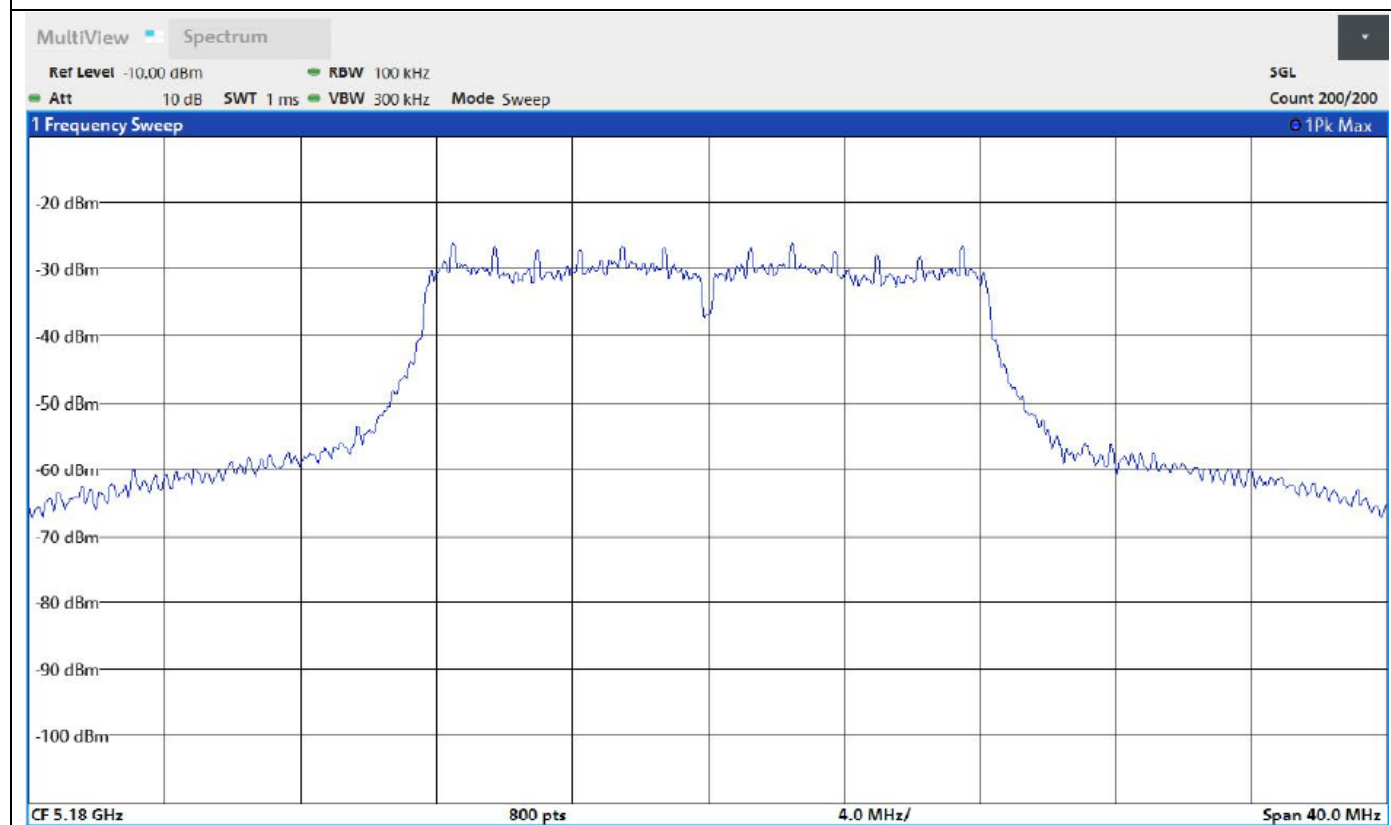
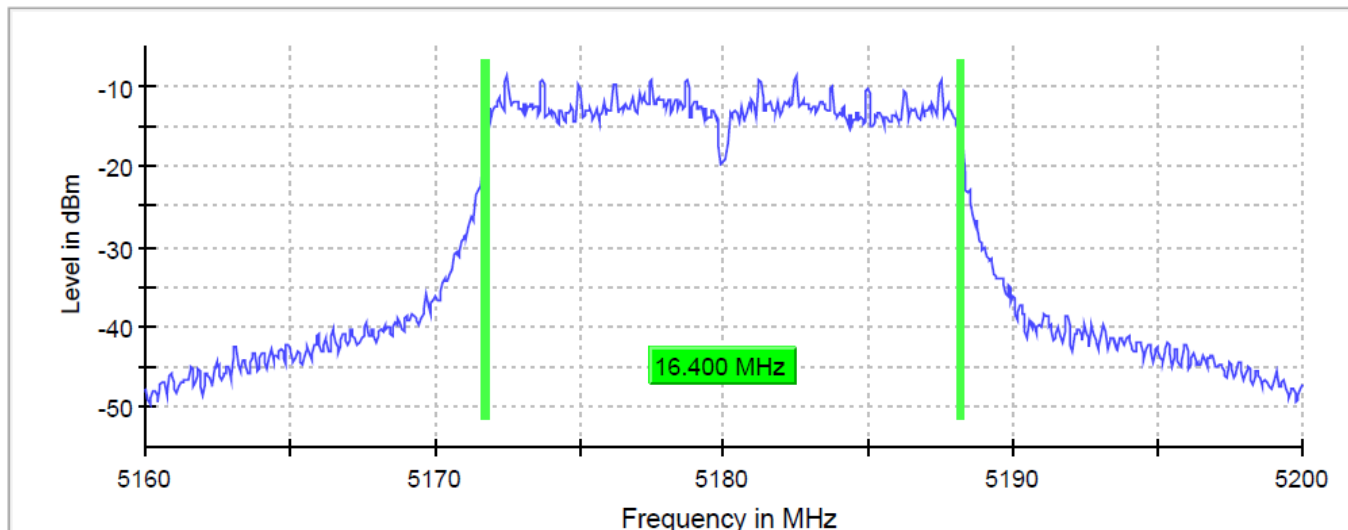
Test according to FCC title 47 part 15 §15.407(a) (e), KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 Section C.2 and ANSI C63.10-2013, ISERC RSS-247 6.2.4(1)

Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 2%

Data Rate	DUT Frequency (MHz)	Bandwidth (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Minimum Limit (MHz)
802.11a 6Mbps	5180.000000	16.400000	5171.775000	5188.175000	0.5
802.11n (HT20) MCS0	5180.000000	17.650000	5171.125000	5188.775000	0.5
802.11ac (VHT20) MCS0	5180.000000	17.650000	5171.125000	5188.775000	0.5
802.11n (HT40) MCS0	5190.000000	35.900000	5172.075000	5207.975000	0.5
802.11ac (VHT40) MCS0	5190.000000	36.000000	5171.975000	5207.975000	0.5
802.11ac (VHT80) MCS0	5210.000000	76.450000	5171.775000	5248.225000	0.5
802.11a 6Mbps	5200.000000	16.450000	5191.775000	5208.225000	0.5
802.11n (HT20) MCS0	5200.000000	17.450000	5191.375000	5208.825000	0.5
802.11ac (VHT20) MCS0	5200.000000	17.450000	5191.375000	5208.825000	0.5
802.11n (HT40) MCS0	5230.000000	35.900000	5212.075000	5247.975000	0.5
802.11ac (VHT40) MCS0	5230.000000	35.900000	5212.075000	5247.975000	0.5
802.11a 6Mbps	5240.000000	16.450000	5231.775000	5248.225000	0.5
802.11n (HT20) MCS0	5240.000000	17.650000	5231.175000	5248.825000	0.5
802.11ac (VHT20) MCS0	5240.000000	17.650000	5231.175000	5248.825000	0.5

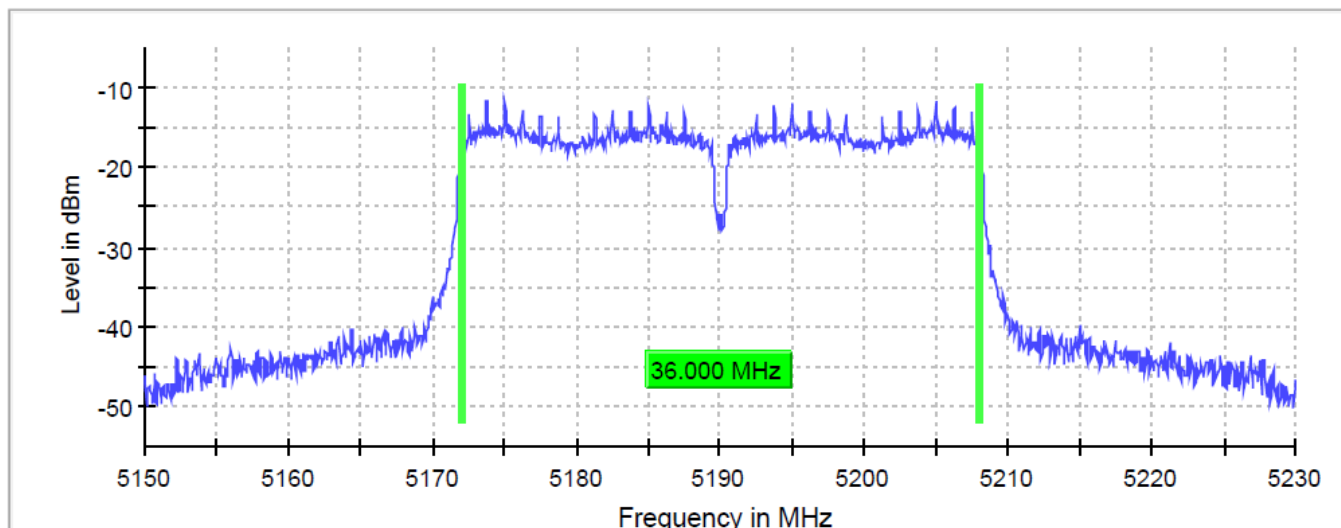
802.11a 5180MHz 6Mbps

6 dB Bandwidth



802.11ac (VHT40) 5190MHz MCS0

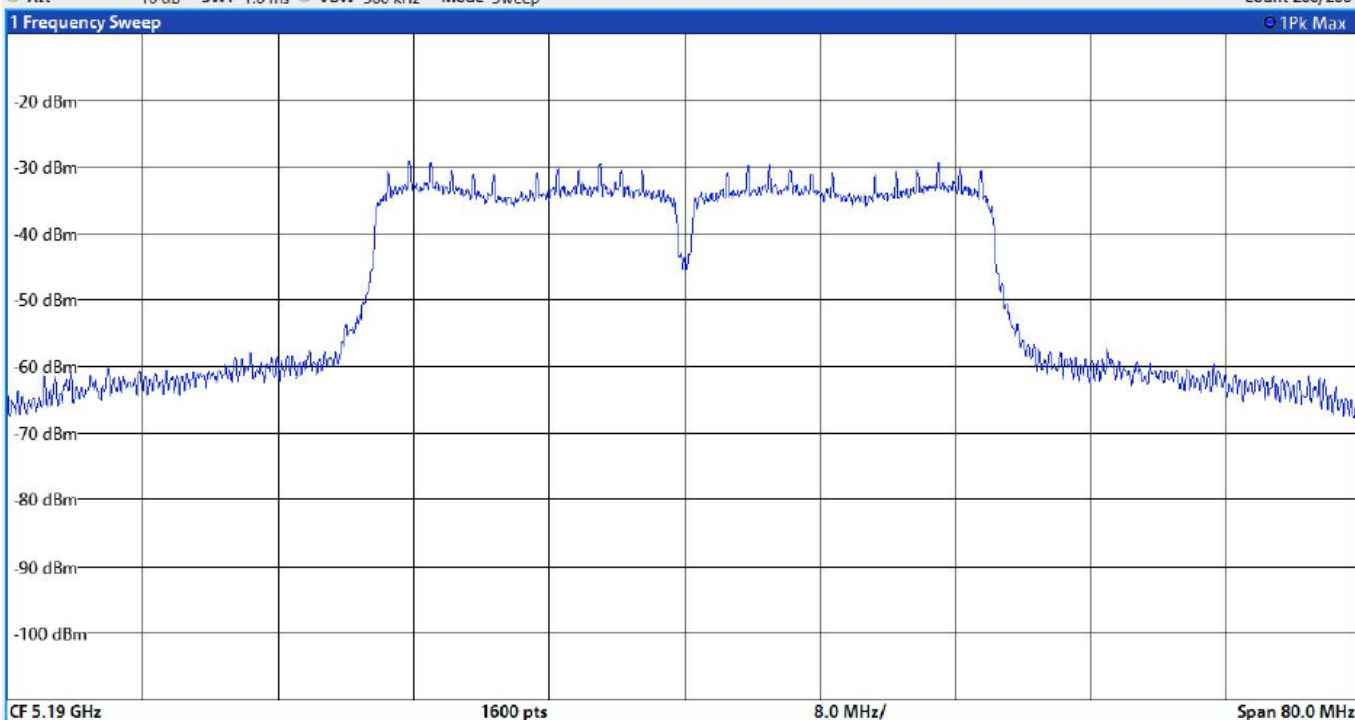
6 dB Bandwidth



MultiView Spectrum

Ref Level -10.00 dBm
Att 10 dB
SWT 1.6 ms
RBW 100 kHz
VBW 300 kHz
Mode Sweep

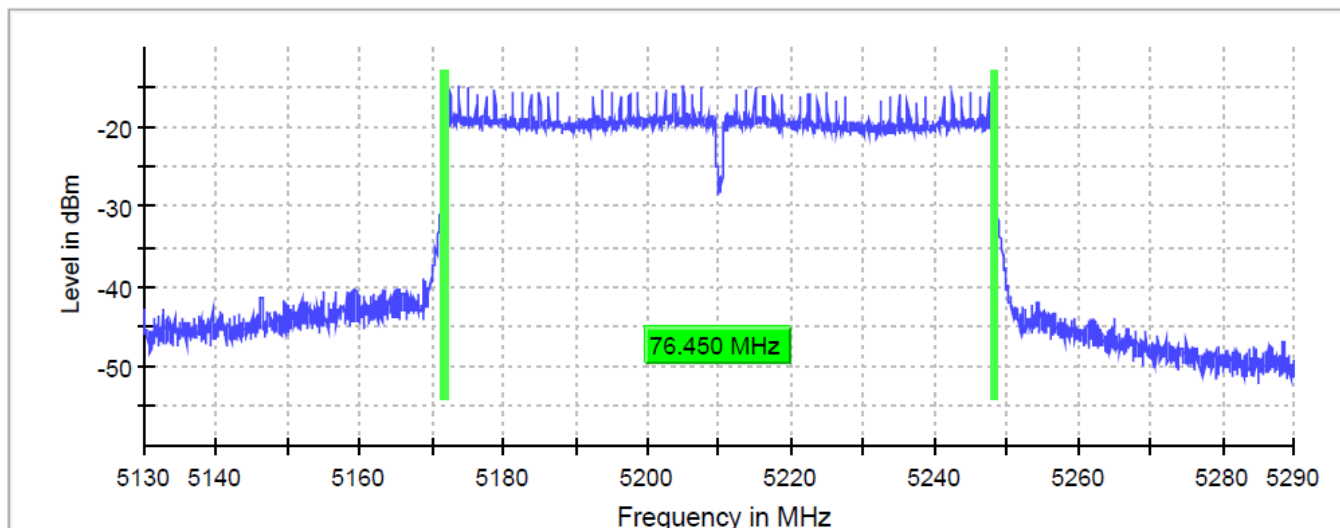
SGL
Count 200/200



CF 5.19 GHz 1600 pts 8.0 MHz/ Span 80.0 MHz

802.11ac (VHT80) 5210MHz MCS0

6 dB Bandwidth



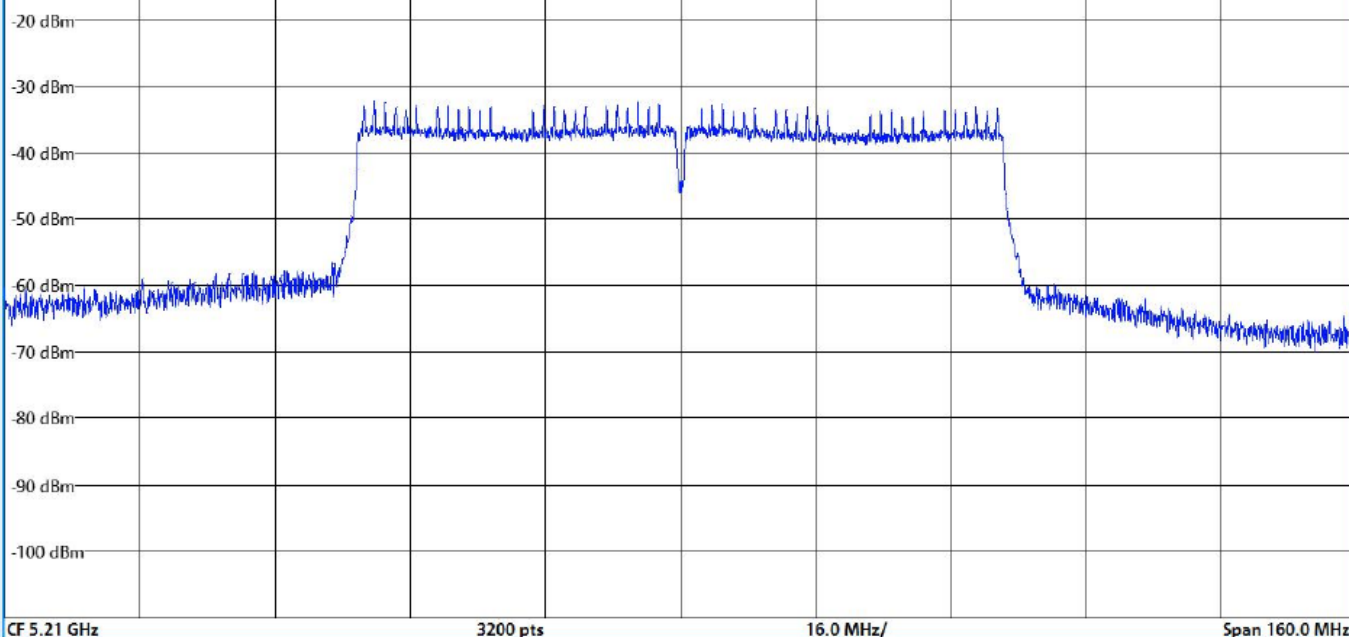
MultiView Spectrum

Ref Level -10.00 dBm
Att 10 dB SWT 3.2 ms RBW 100 kHz
VBW 300 kHz Mode Sweep

SGL
Count 200/200

1 Frequency Sweep

1Pk Max



CF 5.21 GHz

3200 pts

16.0 MHz/

Span 160.0 MHz

4.4.4 Occupied Channel Bandwidth

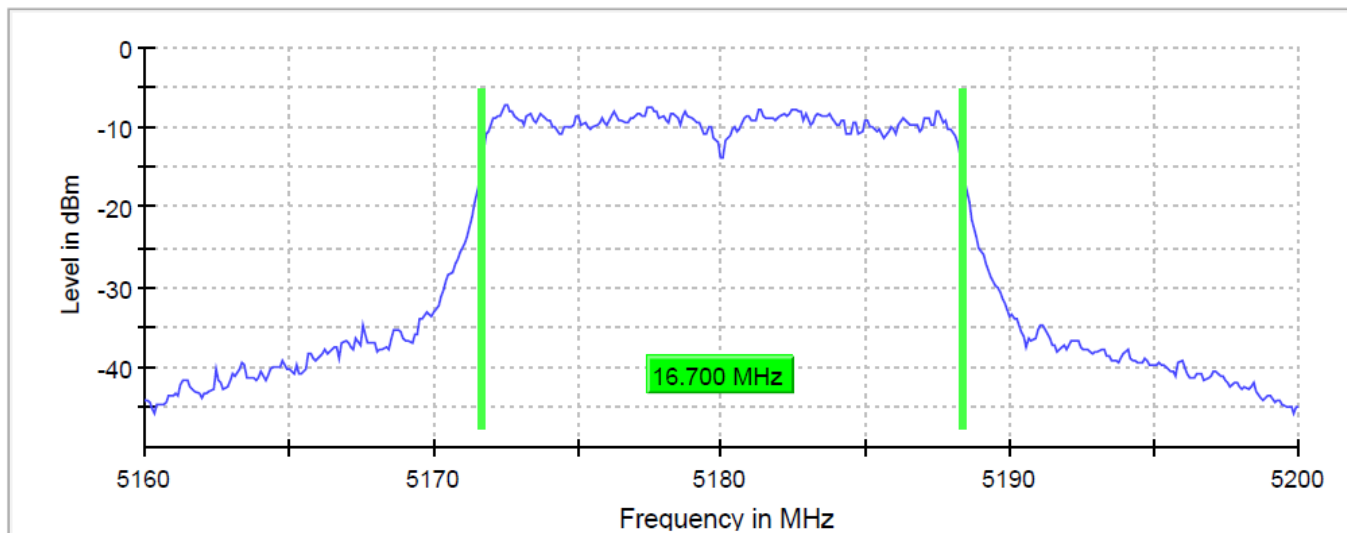
Test according to RSS-GEN Section 6.7, KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 D and ANSI C63.10-2013.

Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 2%

Data Rate	DUT Frequency (MHz)	Bandwidth (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Band Limit (MHz)
802.11a 6Mbps	5180.000000	16.700000	5171.650000	5188.350000	5150-5250
802.11n (HT20) MCS0	5180.000000	17.700000	5171.150000	5188.850000	5150-5250
802.11ac (VHT20) MCS0	5180.000000	17.700000	5171.150000	5188.850000	5150-5250
802.11n (HT40) MCS0	5190.000000	36.750000	5171.625000	5208.375000	5150-5250
802.11ac (VHT40) MCS0	5190.000000	36.750000	5171.625000	5208.375000	5150-5250
802.11ac (VHT80) MCS0	5210.000000	77.500000	5171.250000	5248.750000	5150-5250
802.11a 6Mbps	5200.000000	16.700000	5191.650000	5208.350000	5150-5250
802.11n (HT20) MCS0	5200.000000	17.800000	5191.150000	5208.950000	5150-5250
802.11ac (VHT20) MCS0	5200.000000	17.800000	5191.150000	5208.950000	5150-5250
802.11n (HT40) MCS0	5230.000000	36.750000	5211.625000	5248.375000	5150-5250
802.11ac (VHT40) MCS0	5230.000000	36.750000	5211.625000	5248.375000	5150-5250
802.11a 6Mbps	5240.000000	16.700000	5231.650000	5248.350000	5150-5250
802.11n (HT20) MCS0	5240.000000	17.800000	5231.150000	5248.950000	5150-5250
802.11ac (VHT20) MCS0	5240.000000	17.800000	5231.150000	5248.950000	5150-5250

802.11a 5180MHz 6Mbps

99 % Bandwidth



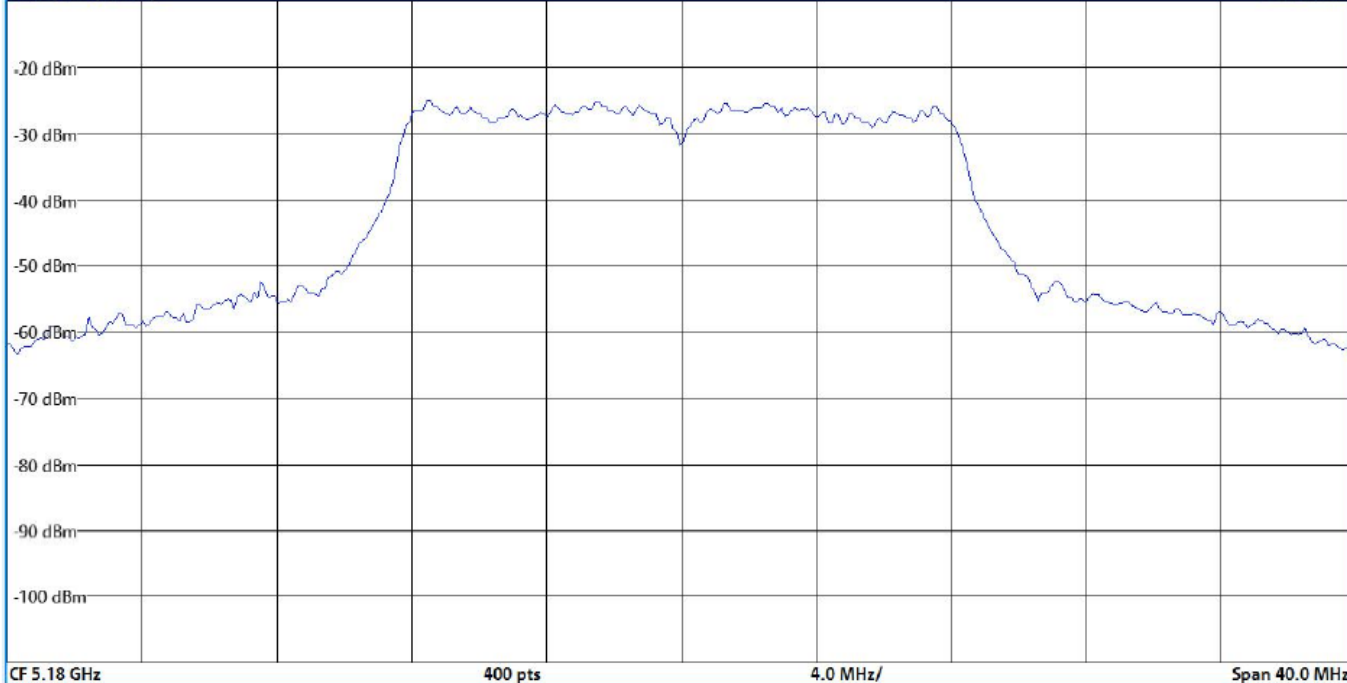
MultiView Spectrum

Ref Level -10.00 dBm
Att 0 dB
RBW 200 kHz
VBW 1 MHz
Mode Sweep

SGL
Count 200/200

1 Frequency Sweep

1Pk Max



CF 5.18 GHz

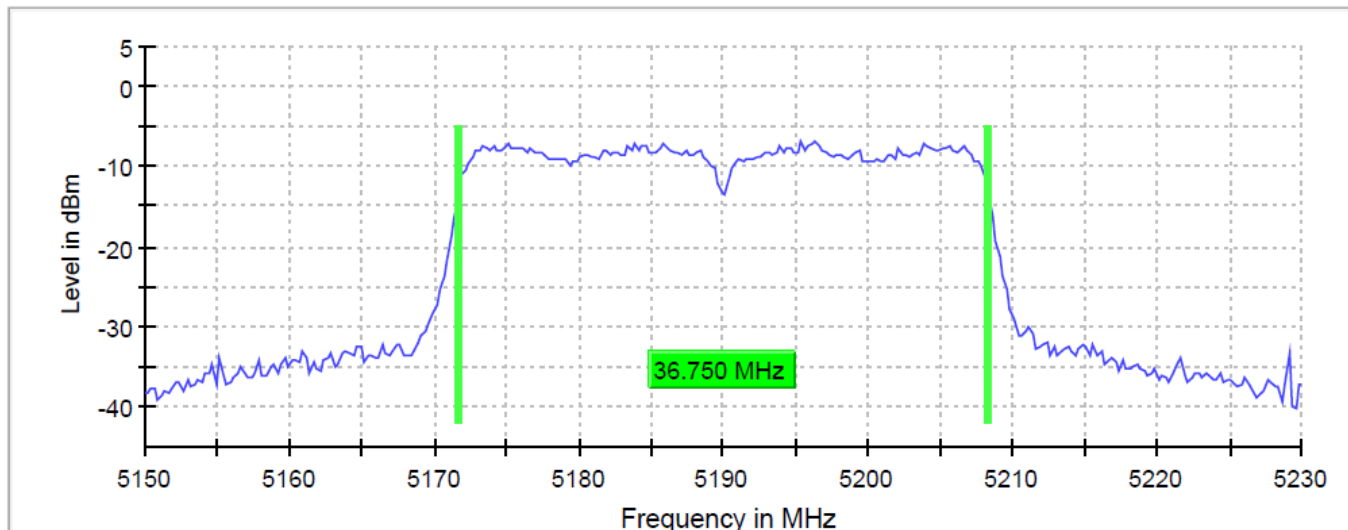
400 pts

4.0 MHz/

Span 40.0 MHz

802.11ac (VHT40) 5190MHz MCS0

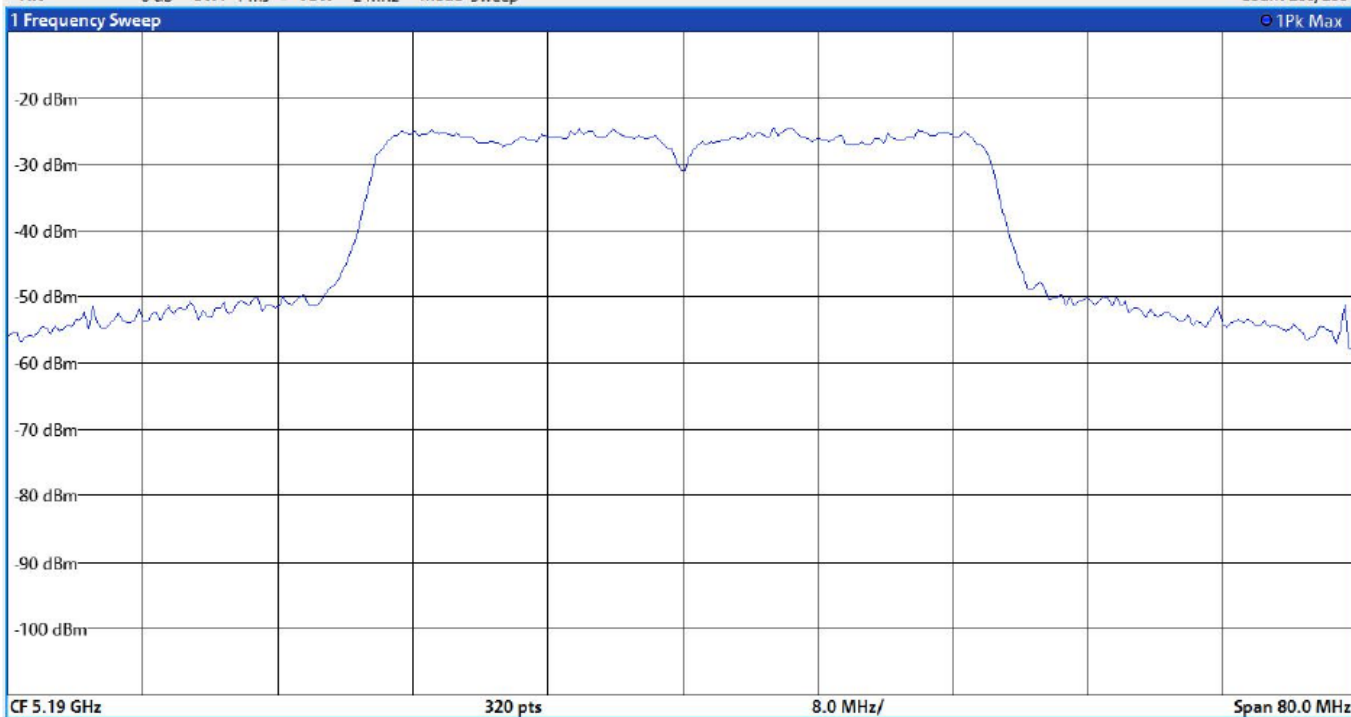
99 % Bandwidth



MultiView Spectrum

Ref Level -10.00 dBm
Att 0 dB
RBW 500 kHz
VBW 2 MHz
Mode Sweep

SGL
Count 200/200



CF 5.19 GHz

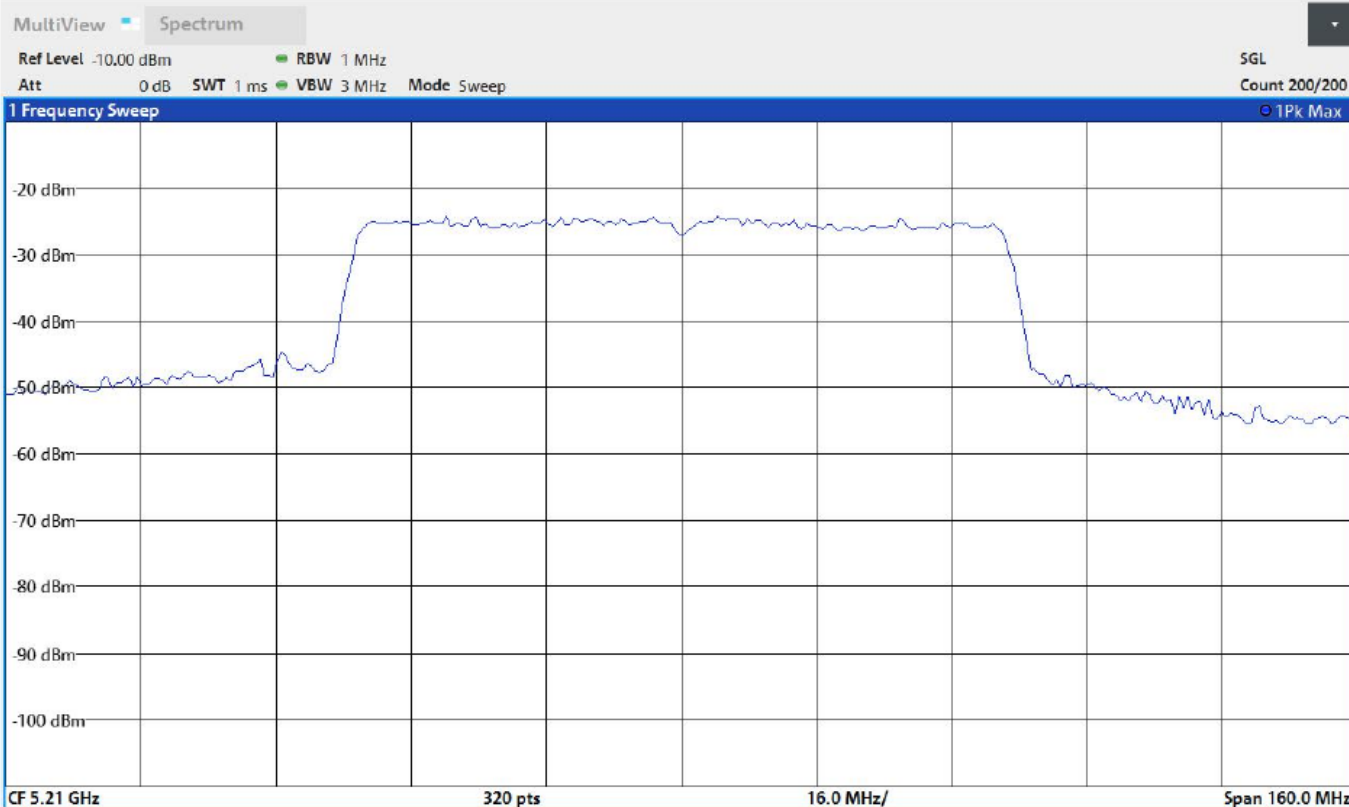
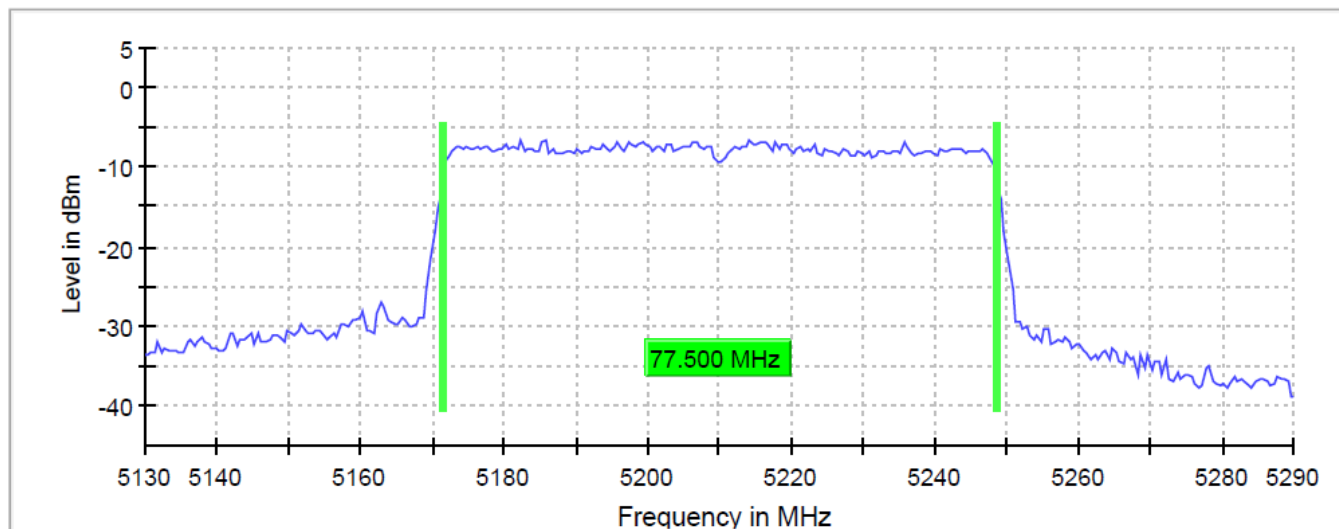
320 pts

8.0 MHz/

Span 80.0 MHz

802.11ac (VHT80) 5210MHz MCS0

99 % Bandwidth



4.5 UNII-3

Mode	Channel	Frequency
802.11a 802.11n(HT20) 802.11ac(VHT20)	149	5745
802.11n(HT40) 802.11ac(VHT40)	151	5755
802.11ac(VHT80)	155	5775
802.11a 802.11n(HT20) 802.11ac(VHT20)	157	5785
802.11n(HT40) 802.11ac(VHT40)	159	5795
802.11a 802.11n(HT20) 802.11ac(VHT20)	165	5825

Notes:- Output power measurements performed on all supported worst data rate of each supported 802.11 mode.

Power Settings

802.11a		802.11n (HT20)		802.11ac (VHT20)	
Channel	Power Setting	Channel	Power Setting	Channel	Power Setting
149	5	149	5	149	5
157	5	157	5	157	5
165	5	165	5	165	5

802.11n (HT40)		802.11ac (VHT40)	
Channel	Power Setting	Channel	Power Setting
151	5	151	5
159	5	159	5

802.11ac (VHT80)	
Channel	Power Setting
155	4

4.5.1 RF output power and Duty-Cycle

FCC and RSS-247

Test according to FCC title 47 part 15 §15.407(a), KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 II.E and ANSI C63.10-2013 (In Reference to KDB 789033 E.3.B)

Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Combined Uncertainty of absolute Level Measurement ($K=2$) < 1 dB

802.11a

Data Rate	Gated RMS (dBm) 5745 MHz	Gated RMS (dBm) 5785 MHz	Gated RMS (dBm) 5825 MHz	Limit (dBm)	Power Setting (dBm)
6 Mbps	5.773	4.906	7.284	30.0	5

802.11n (HT20)

Data Rate	Gated RMS (dBm) 5745 MHz	Gated RMS (dBm) 5785 MHz	Gated RMS (dBm) 5825 MHz	Limit (dBm)	Power Setting (dBm)
MCS0	6.001	5.086	7.552	30.0	5

802.11ac (VHT20)

Data Rate	Gated RMS (dBm) 5745 MHz	Gated RMS (dBm) 5785 MHz	Gated RMS (dBm) 5825 MHz	Limit (dBm)	Power Setting (dBm)
MCS0	6.294	5.342	7.237	30.0	5

802.11n (HT40)

Data Rate	Gated RMS (dBm) 5755 MHz	Gated RMS (dBm) 5795 MHz	Limit (dBm)	Power Setting (dBm)
MCS0	5.395	4.692	30.0	5

802.11ac (VHT40)

Data Rate	Gated RMS (dBm) 5755 MHz	Gated RMS (dBm) 5795 MHz	Limit (dBm)	Power Setting (dBm)
MCS0	5.598	4.887	30.0	5

802.11ac (VHT80)

Data Rate	Gated RMS (dBm) 5775 MHz	Limit (dBm)	Power Setting (dBm)
MCS0	5.396	30.0	4

4.5.2 Power Spectral Density

FCC and RSS-247

Test according to FCC title 47 part 15 §15.407(a), KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 II.F with test method SA-1 and ANSI C63.10-2013

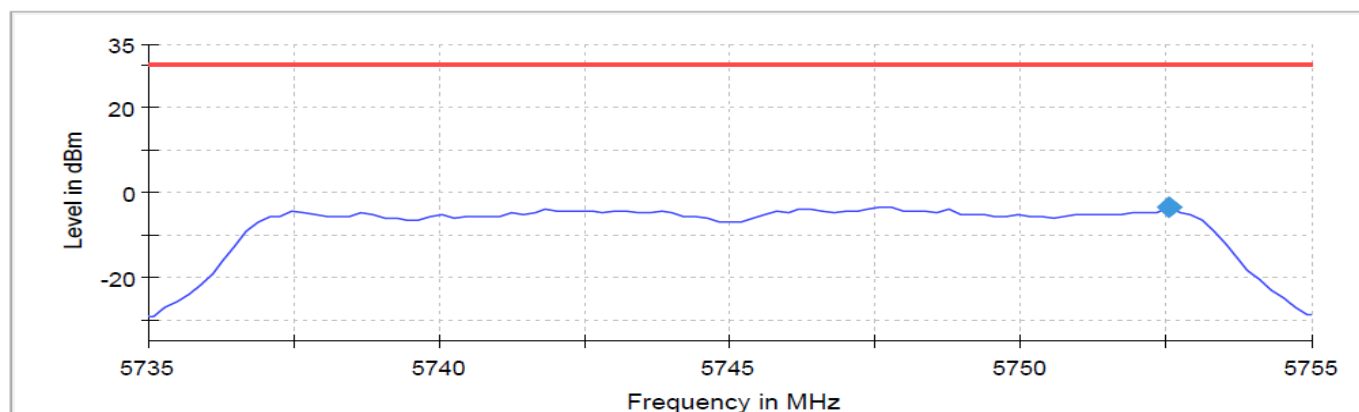
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 1.3 dB

802.11a 6Mbps

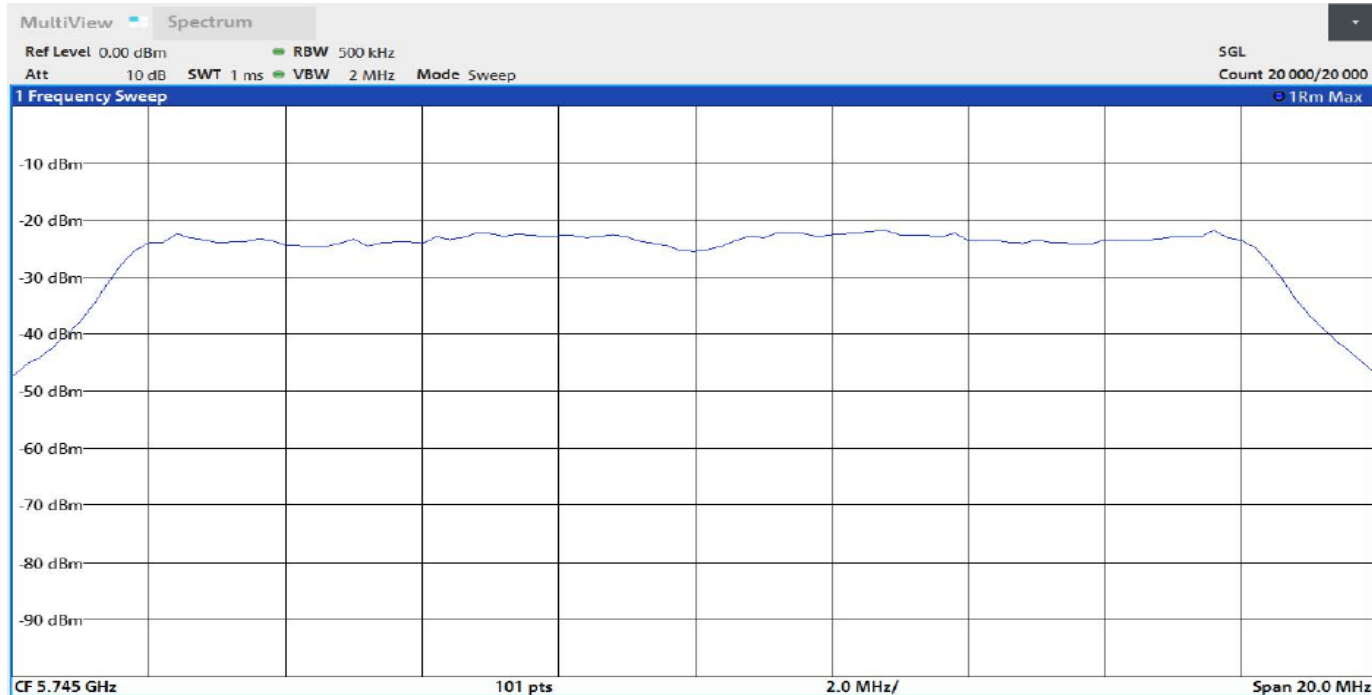
Data Rate	PSD (dBm) 5745 MHz	PSD (dBm) 5785 MHz	PSD (dBm) 5825 MHz	Limit (dBm)
6Mbps	-3.481	-4.495	-4.230	30.0

802.11a 5745 MHz 6Mbps

Power Spectral Density



Connector 1 Sum Level Limit PSD



802.11n (HT20)

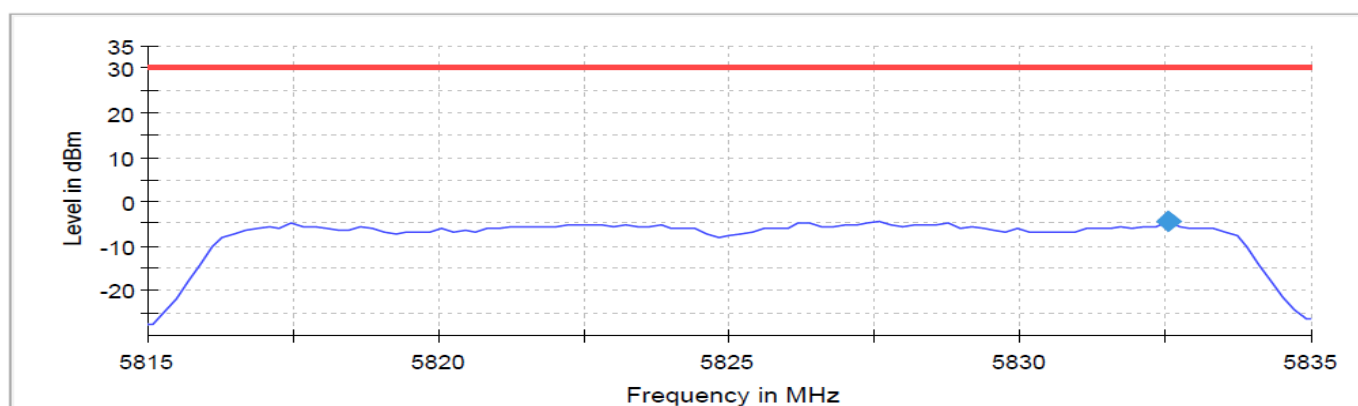
Data Rate	PSD (dBm) 5745 MHz	PSD (dBm) 5785 MHz	PSD (dBm) 5825 MHz	Limit (dBm)
MCS0	-3.404	-4.450	-4.262	30.0

802.11n (HT40)

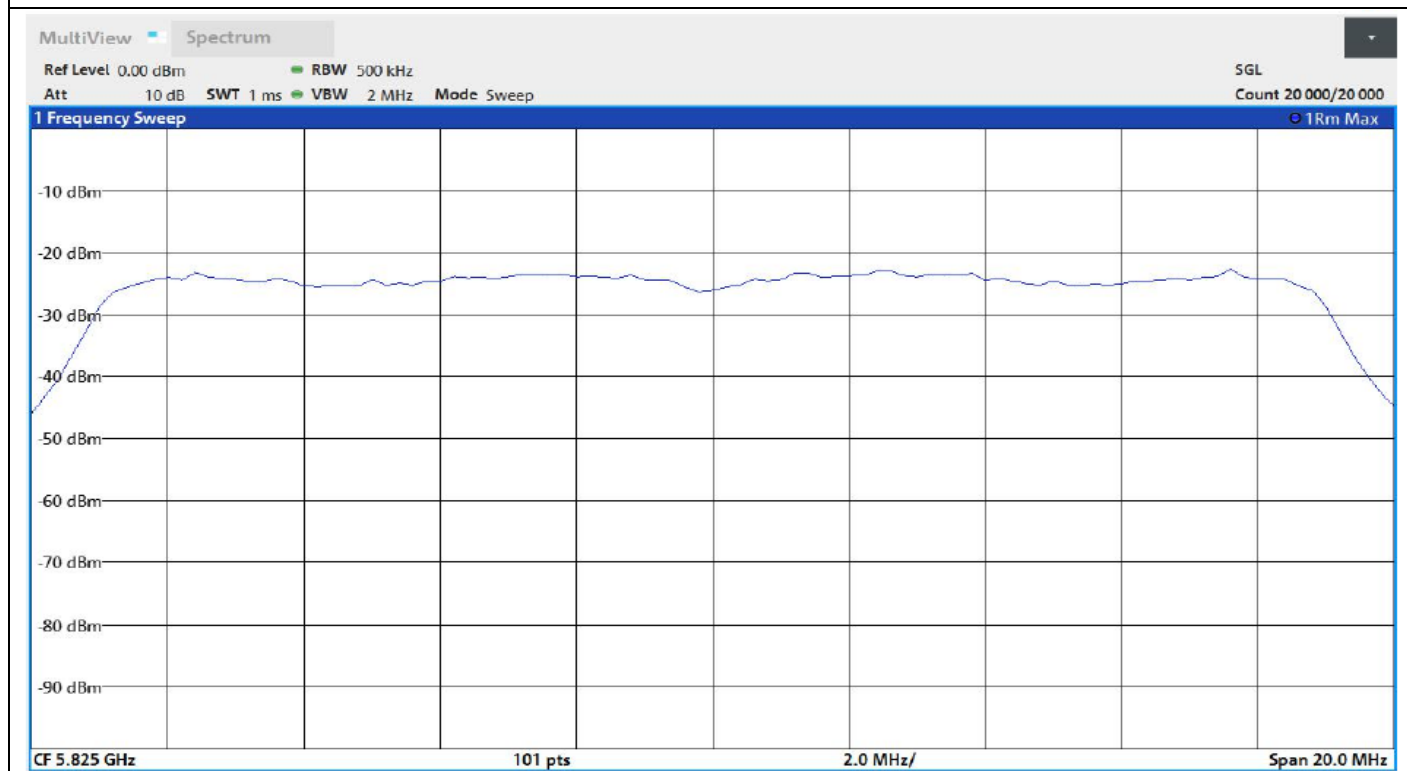
Data Rate	PSD (dBm) 5755 MHz	PSD (dBm) 5795 MHz	Limit (dBm)
MCS0	-5.734	-6.747	30.0

802.11n (HT20) 5825 MHz MCS0

Power Spectral Density



Connector 1 Sum Level Limit PSD



802.11ac (VHT20)

Data Rate	PSD (dBm) 5745 MHz	PSD (dBm) 5785 MHz	PSD (dBm) 5825 MHz	Limit (dBm)
MCS0	-3.321	-4.436	-4.222	30.0

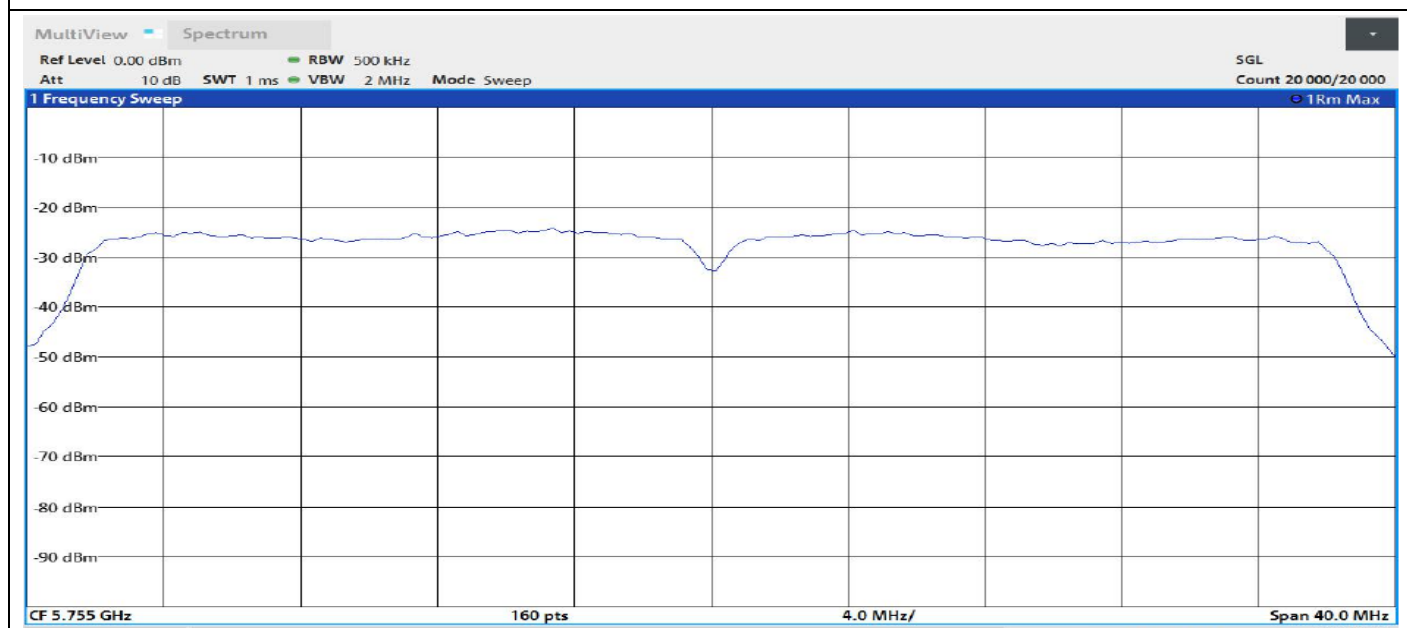
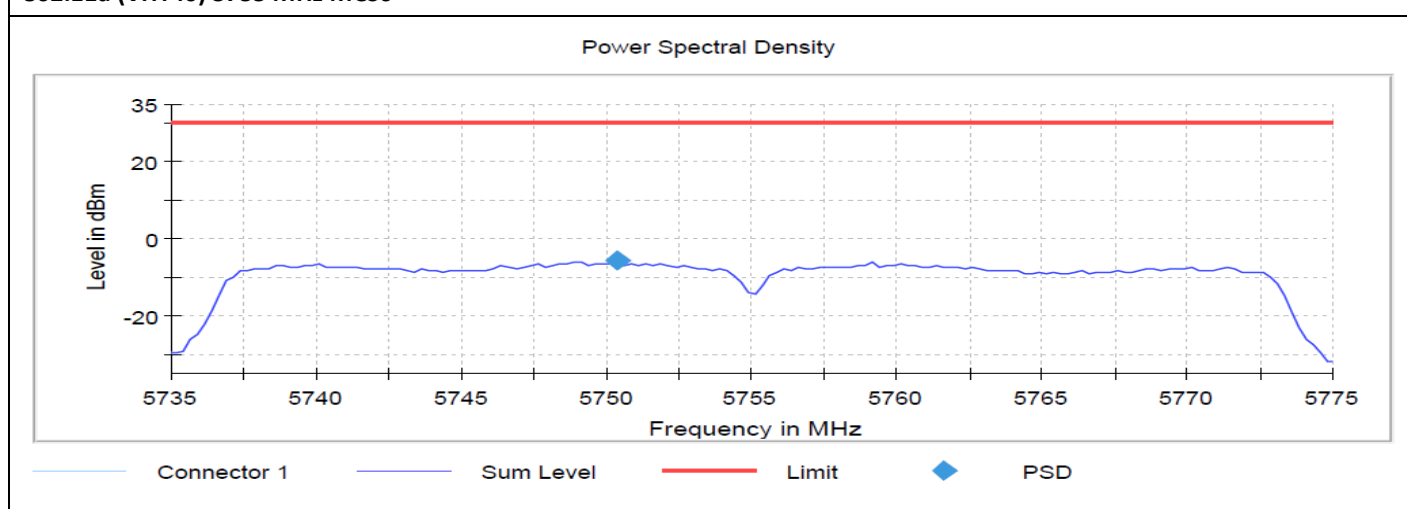
802.11ac (VHT40)

Data Rate	PSD (dBm) 5755 MHz	PSD (dBm) 5795 MHz	Limit (dBm)
MCS0	-5.864	-6.874	30.0

802.11ac (VHT80)

Data Rate	PSD (dBm) 5775 MHz	Limit (dBm)
MCS0	-8.213	30.0

802.11a (VHT40) 5755 MHz MCS0



4.5.3 DTS Bandwidth 6dB

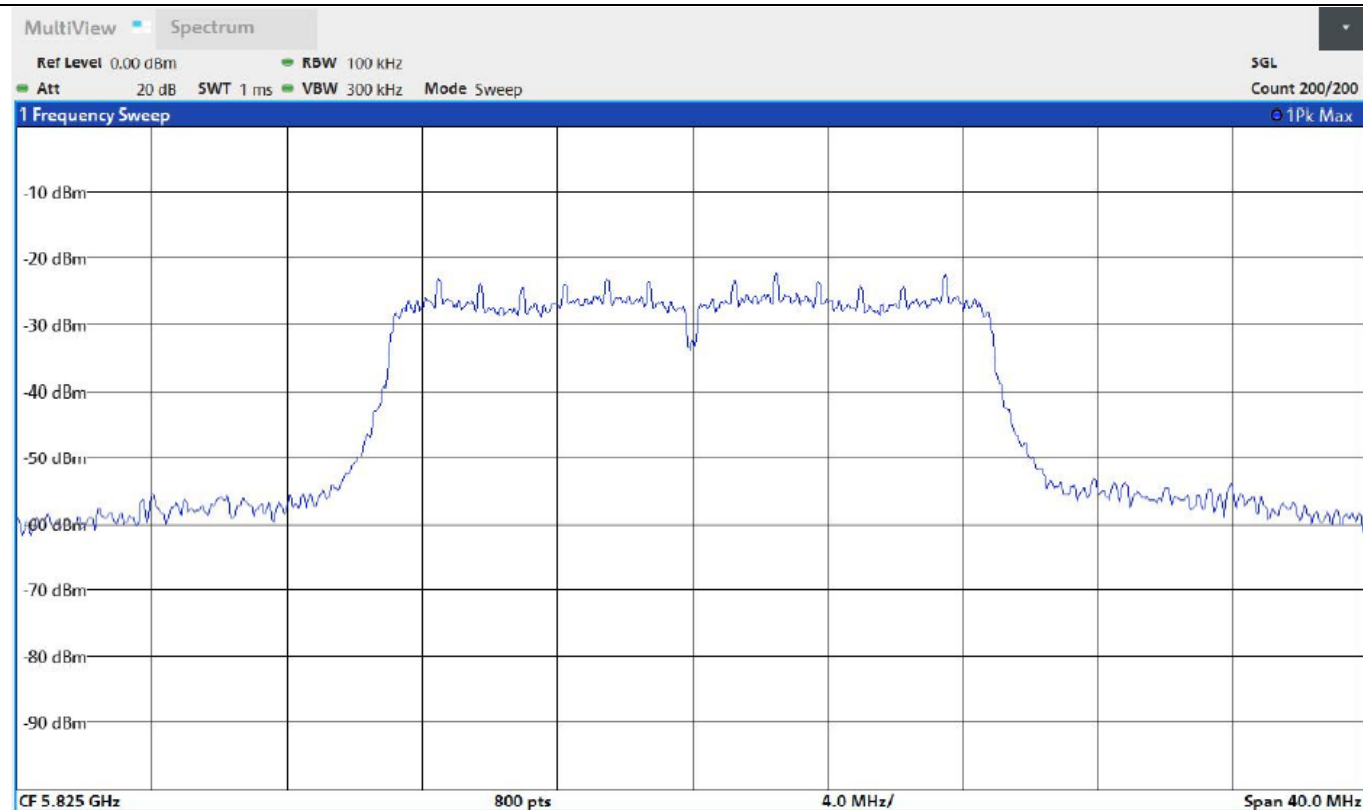
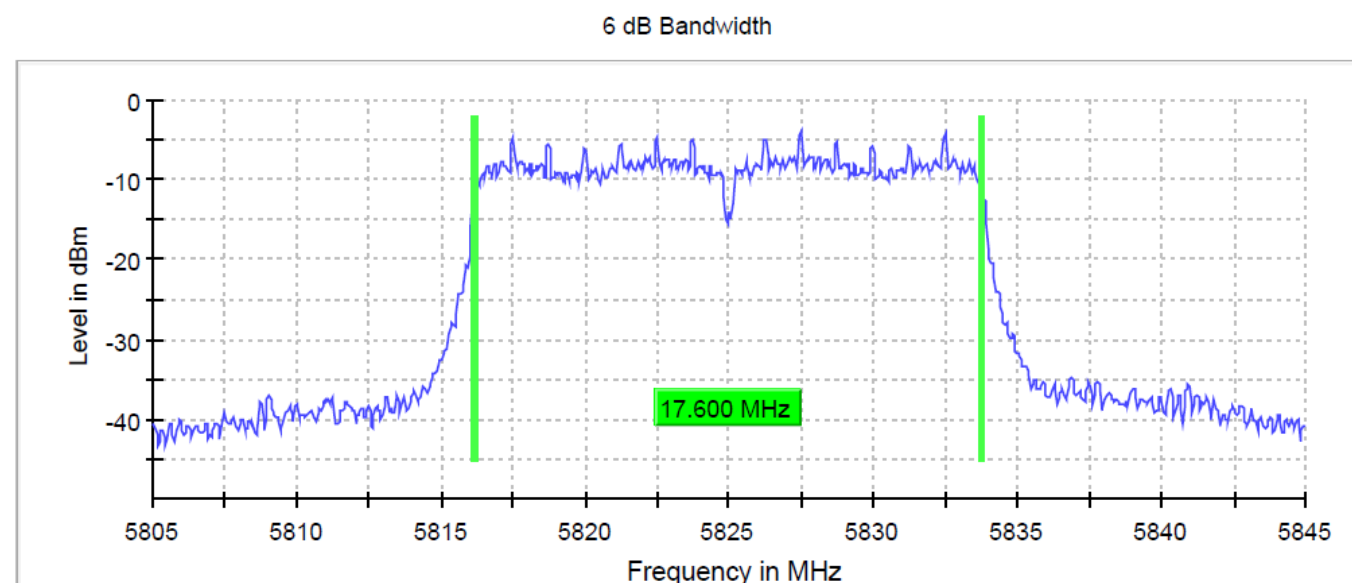
FCC and RSS-247

Test according to FCC title 47 part 15 §15.407(a) (e), KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 Section C.2 and ANSI C63.10-2013, ISEDC RSS-247 6.2.4(1)

Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 2%

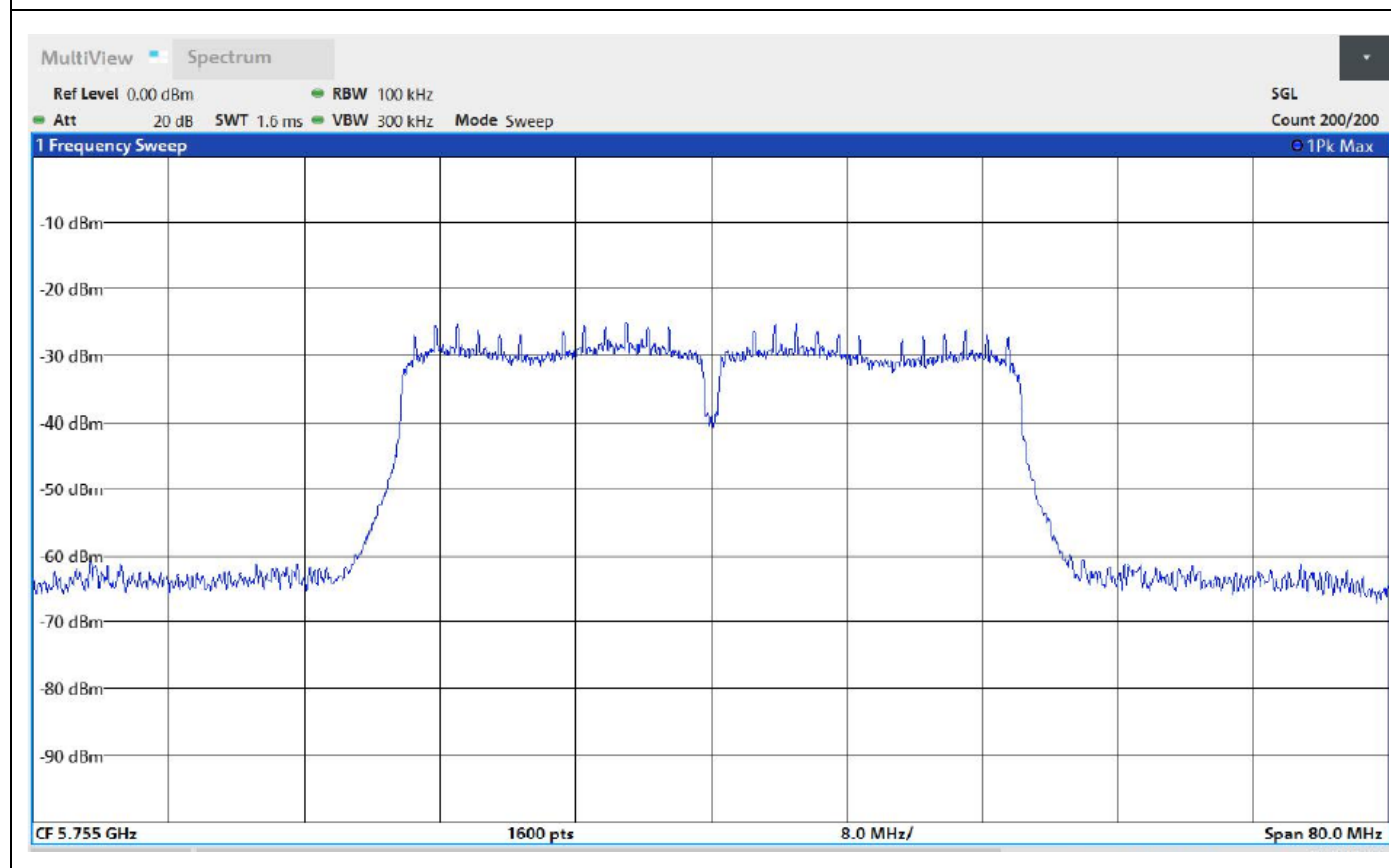
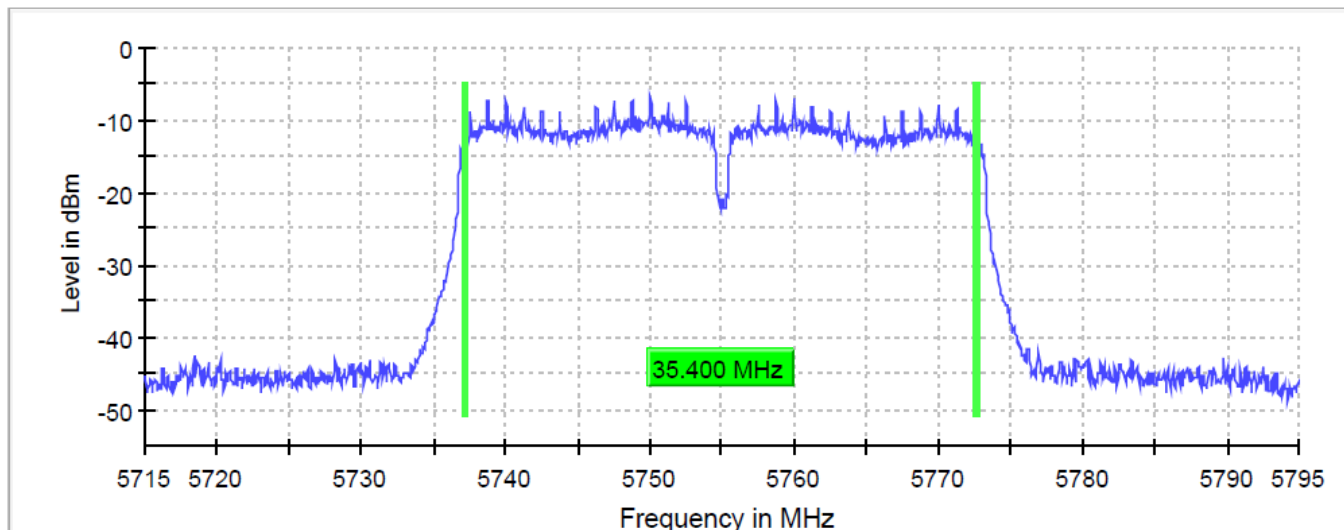
Data Rate	DUT Frequency (MHz)	Bandwidth (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Minimum Band Limit (MHz)
802.11a 6Mbps	5745.000000	16.400000	5736.775000	5753.175000	0.500000
802.11n (HT20) MCS0	5745.000000	17.400000	5736.375000	5753.775000	0.500000
802.11ac (VHT20) MCS0	5745.000000	17.400000	5736.375000	5753.775000	0.500000
802.11n (HT40) MCS0	5755.000000	35.500000	5737.175000	5772.675000	0.500000
802.11ac (VHT40) MCS0	5755.000000	35.400000	5737.225000	5772.625000	0.500000
802.11ac (VHT80) MCS0	5775.000000	76.000000	5736.825000	5812.825000	0.500000
802.11a 6Mbps	5785.000000	16.400000	5776.775000	5793.175000	0.500000
802.11n (HT20) MCS0	5785.000000	17.600000	5776.175000	5793.775000	0.500000
802.11ac (VHT20) MCS0	5785.000000	17.600000	5776.175000	5793.775000	0.500000
802.11n (HT40) MCS0	5795.000000	35.600000	5777.075000	5812.675000	0.500000
802.11ac (VHT40) MCS0	5795.000000	35.550000	5777.075000	5812.625000	0.500000
802.11a 6Mbps	5825.000000	16.400000	5816.775000	5833.175000	0.500000
802.11n (HT20) MCS0	5825.000000	17.600000	5816.175000	5833.775000	0.500000
802.11ac (VHT20) MCS0	5825.000000	17.650000	5816.175000	5833.825000	0.500000

802.11n 5825MHz MCS0



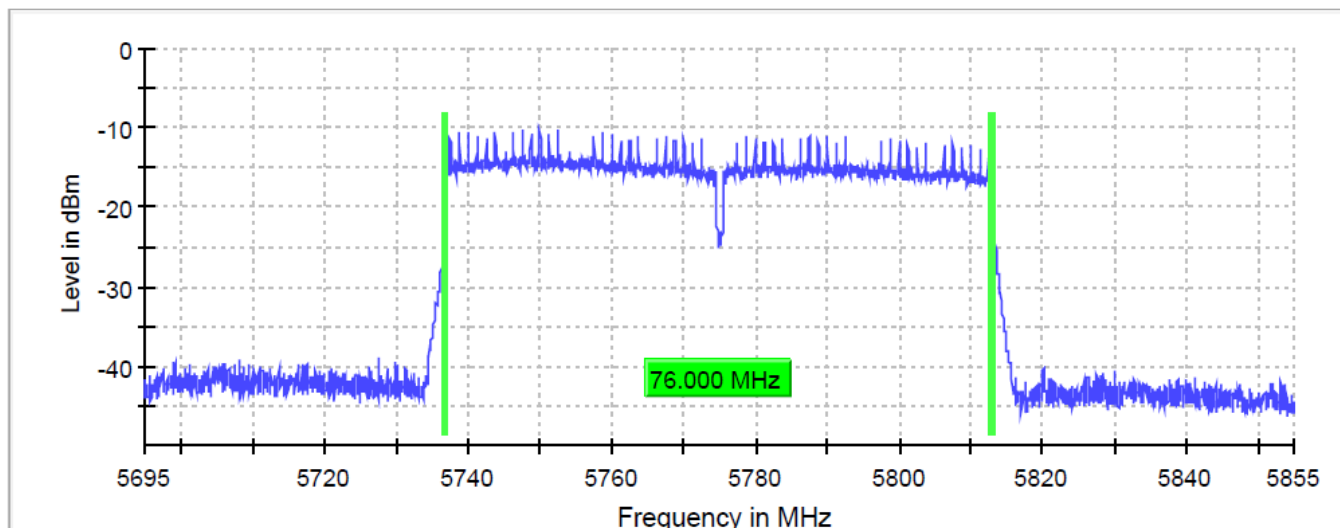
802.11ac 5755MHz (VHT40) MCS0

6 dB Bandwidth



802.11ac 5775MHz (VHT80) MCS0

6 dB Bandwidth



MultiView Spectrum

Ref Level 0.00 dBm

RBW 100 kHz

SGL

Att 20 dB

SWT 3.2 ms

VBW 300 kHz

Mode Sweep

Count 200/200

1 Frequency Sweep

0.1Pk Max

-10 dBm

-20 dBm

-30 dBm

-40 dBm

-50 dBm

-60 dBm

-70 dBm

-80 dBm

-90 dBm

CF 5.775 GHz

3200 pts

16.0 MHz/

Span 160.0 MHz

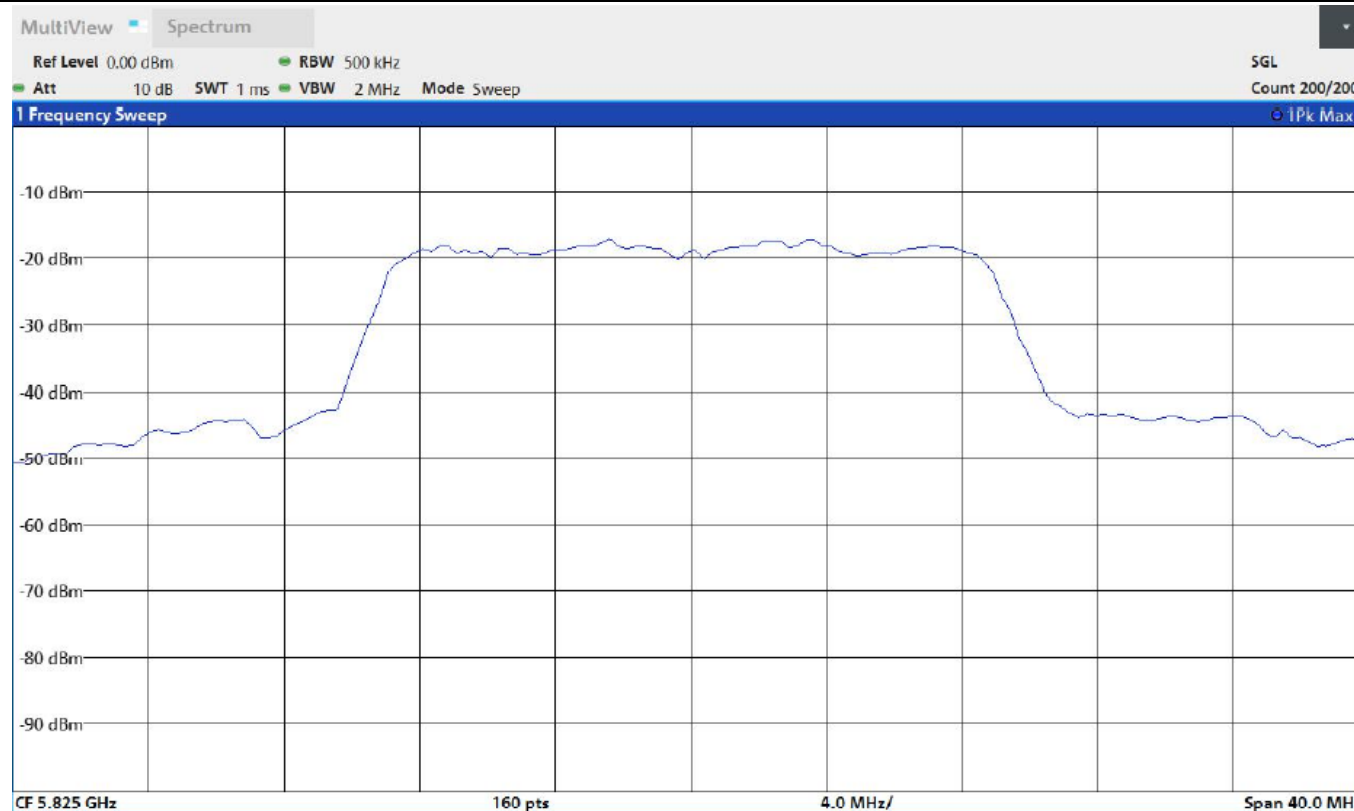
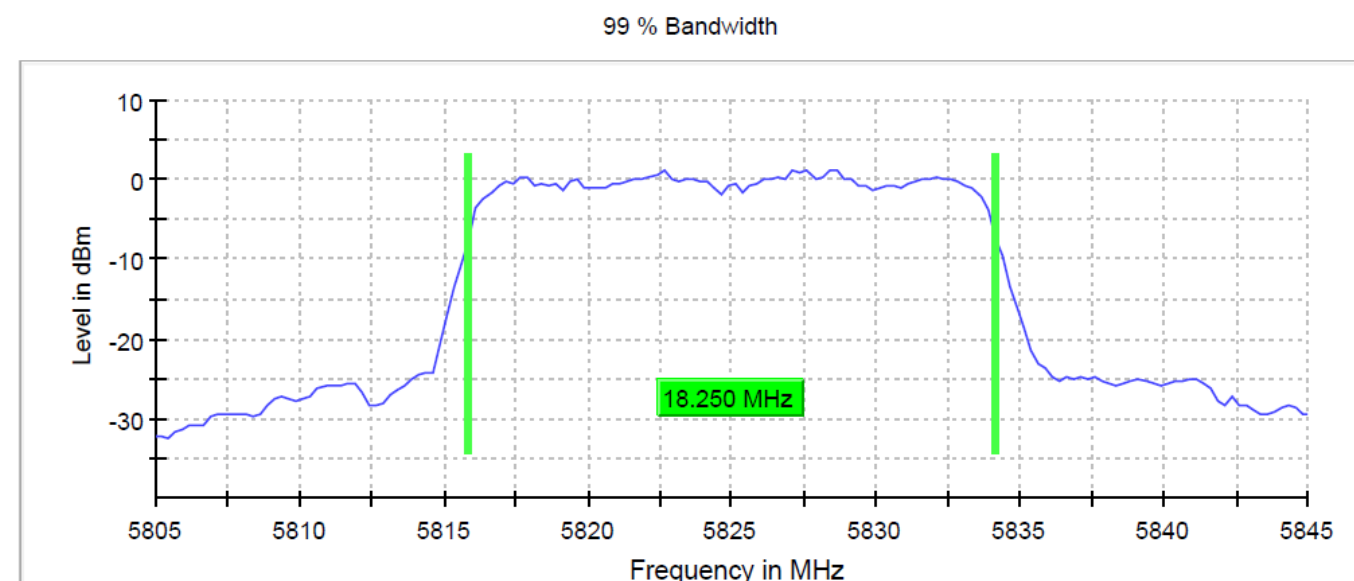
4.5.4 Occupied Channel Bandwidth

Test according to RSS-GEN Section 6.7, KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 D and ANSI C63.10-2013

Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 2%

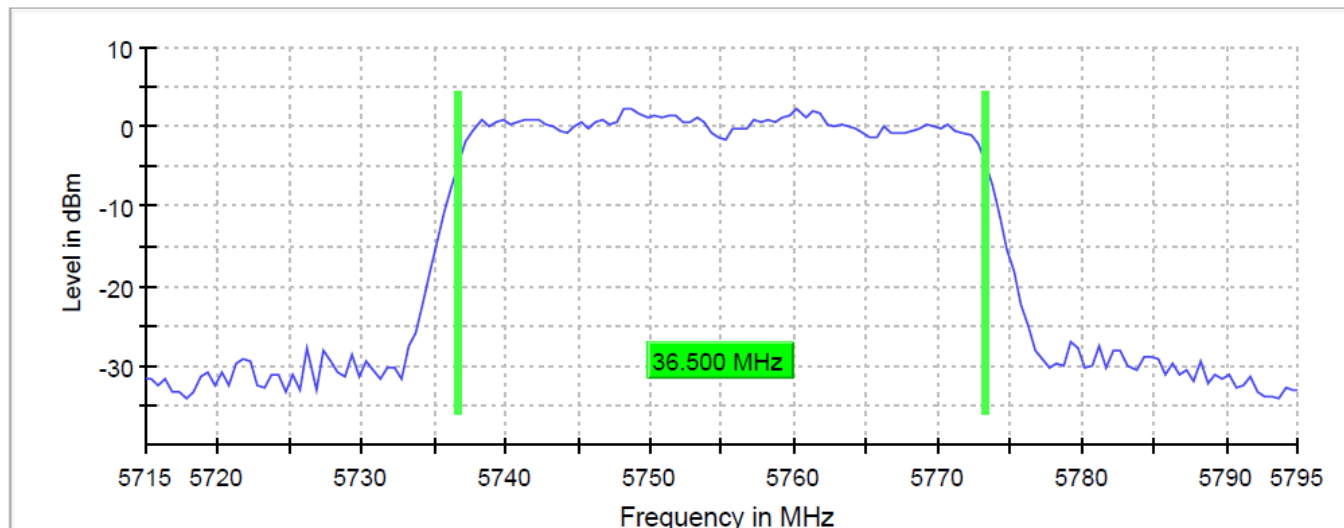
Data Rate	DUT Frequency (MHz)	Bandwidth (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Band Limit (MHz)
802.11a 6Mbps	5745.000000	17.250000	5736.375000	5753.625000	5725-5850
802.11n (HT20) MCS0	5745.000000	18.250000	5735.875000	5754.125000	5725-5850
802.11ac (VHT20) MCS0	5745.000000	18.250000	5735.875000	5754.125000	5725-5850
802.11n (HT40) MCS0	5755.000000	36.500000	5736.750000	5773.250000	5725-5850
802.11ac (VHT40) MCS0	5755.000000	36.500000	5736.750000	5773.250000	5725-5850
802.11ac (VHT80) MCS0	5775.000000	77.000000	5736.500000	5813.500000	5725-5850
802.11a 6Mbps	5785.000000	17.250000	5776.375000	5793.625000	5725-5850
802.11n (HT20) MCS0	5785.000000	18.250000	5775.875000	5794.125000	5725-5850
802.11ac (VHT20) MCS0	5785.000000	18.250000	5775.875000	5794.125000	5725-5850
802.11n (HT40) MCS0	5795.000000	36.500000	5776.750000	5813.250000	5725-5850
802.11ac (VHT40) MCS0	5795.000000	36.500000	5776.750000	5813.250000	5725-5850
802.11a 6Mbps	5825.000000	17.500000	5816.375000	5833.875000	5725-5850
802.11n (HT20) MCS0	5825.000000	18.250000	5815.875000	5834.125000	5725-5850
802.11ac (VHT20) MCS0	5825.000000	18.250000	5815.875000	5834.125000	5725-5850

802.11n (HT20) 5825MHz MCS0



802.11n (HT40) 5755MHz MCS0

99 % Bandwidth



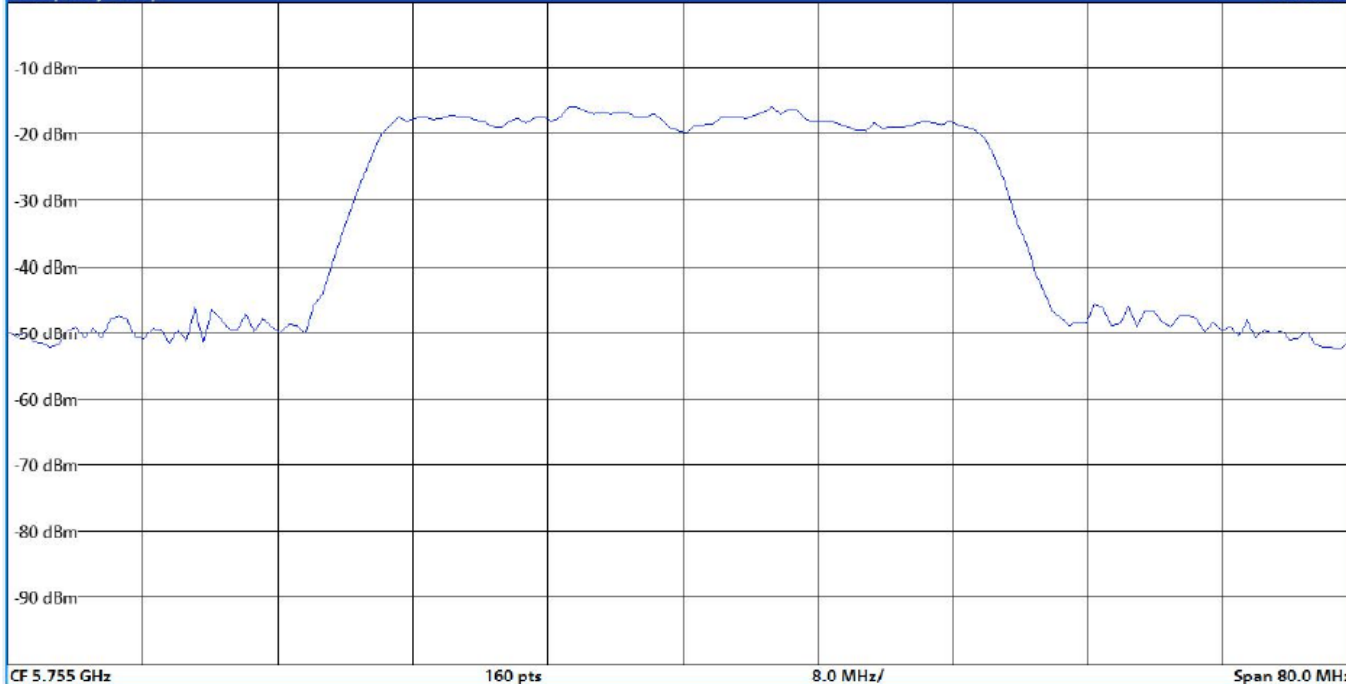
MultiView Spectrum

Ref Level 0.00 dBm RBW 1 MHz
Att 10 dB SWT 1 ms VBW 3 MHz Mode Sweep

SGL
Count 200/200

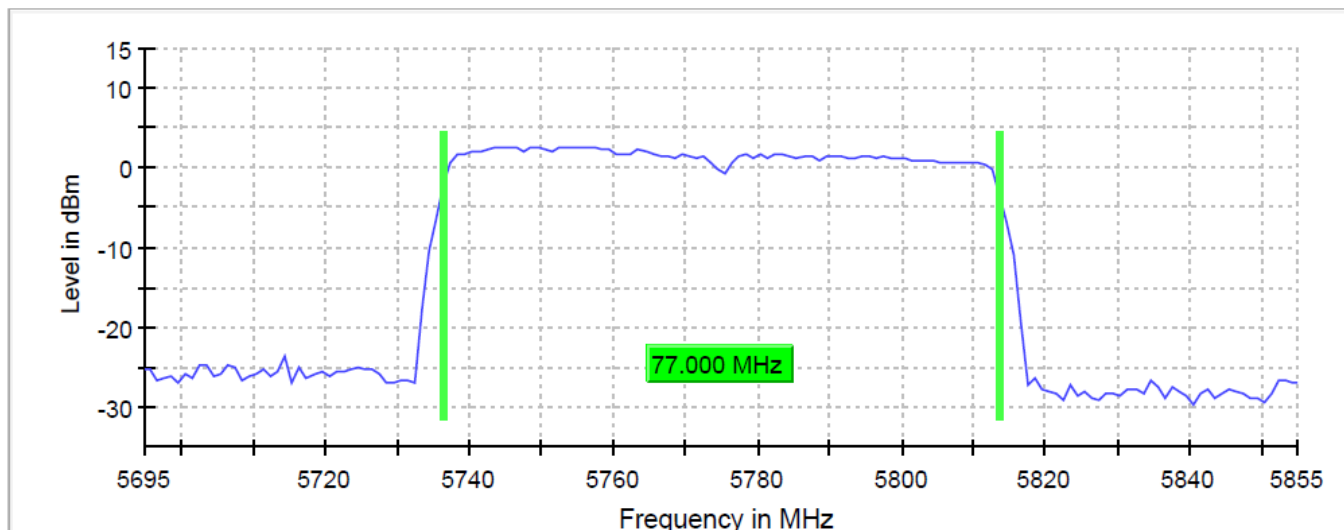
1 Frequency Sweep

1Pk Max



802.11ac (VHT80) 5775MHz MCS0

99 % Bandwidth



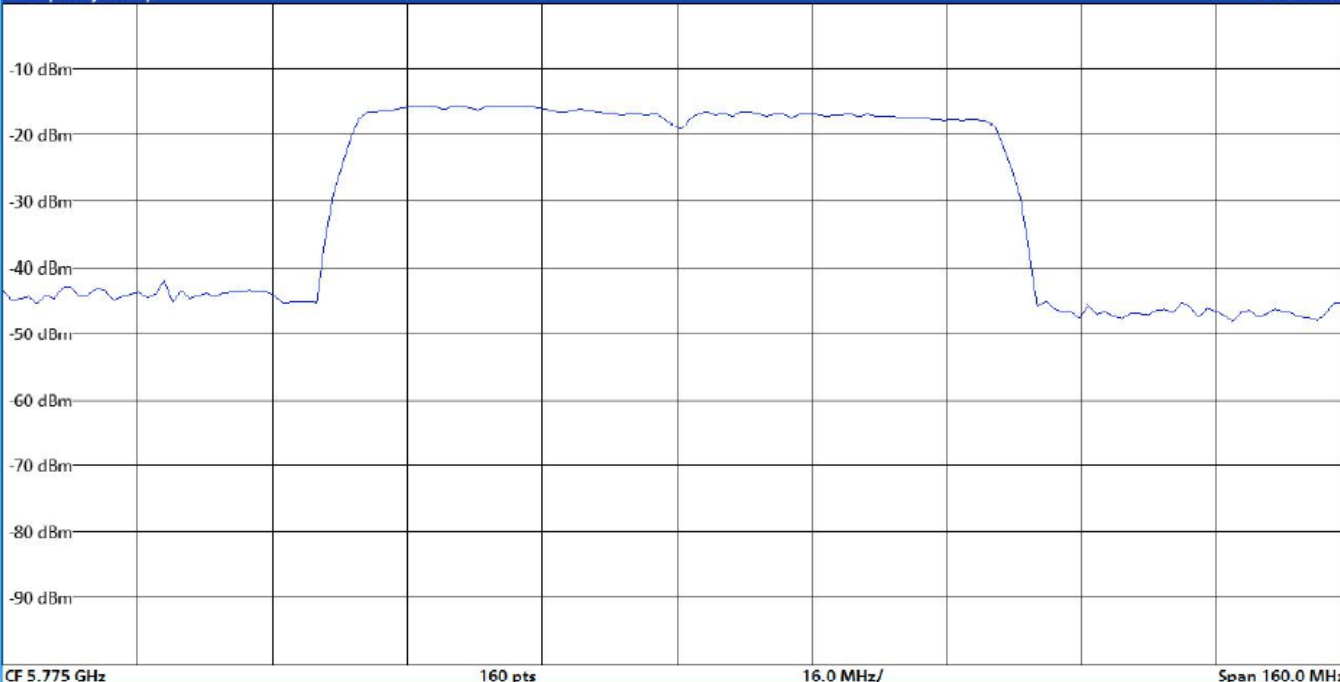
MultiView Spectrum

Ref Level 0.00 dBm RBW 2 MHz
Att 10 dB SWT 1 ms VBW 10 MHz Mode Sweep

SGL
Count 200/200

1 Frequency Sweep

1Pk Max



5. RADIATED TESTING

5.1 Test Summary

Start: 09/27/2024	End: 10/16/2024	Temperature: 24.9°C Humidity: 39.3%R.H	Initials: AP/AB
-------------------	-----------------	---	-----------------

DUT S/N	J23133#2 NA 3B		DUT Operating Mode		5GHz WLAN
Comment	Worst case 20MHz channels from 802.11a and (802.11n/802.11ac) modulations are tested Worst case 40MHz and 80MHz channels from (802.11n/802.11ac) are tested.				
Antenna	Frequency Range	Polarization	Result Over/Under Limit		Notes
Loop	9kHz-30MHz	Parallel	☐ Over	☒ Under	√
		Perpendicular	☐ Over	☒ Under	√
		Ground-Parallel	☐ Over	☒ Under	√
Log Periodic	30MHz-1GHz	Horizontal	☐ Over	☒ Under	√
		Vertical	☐ Over	☒ Under	√
Horn	1GHz-18GHz	Horizontal	☐ Over	☒ Under	√
		Vertical	☐ Over	☒ Under	√
Horn	18GHz-27.5GHz	Horizontal	☐ Over	☒ Under	√
		Vertical	☐ Over	☒ Under	√

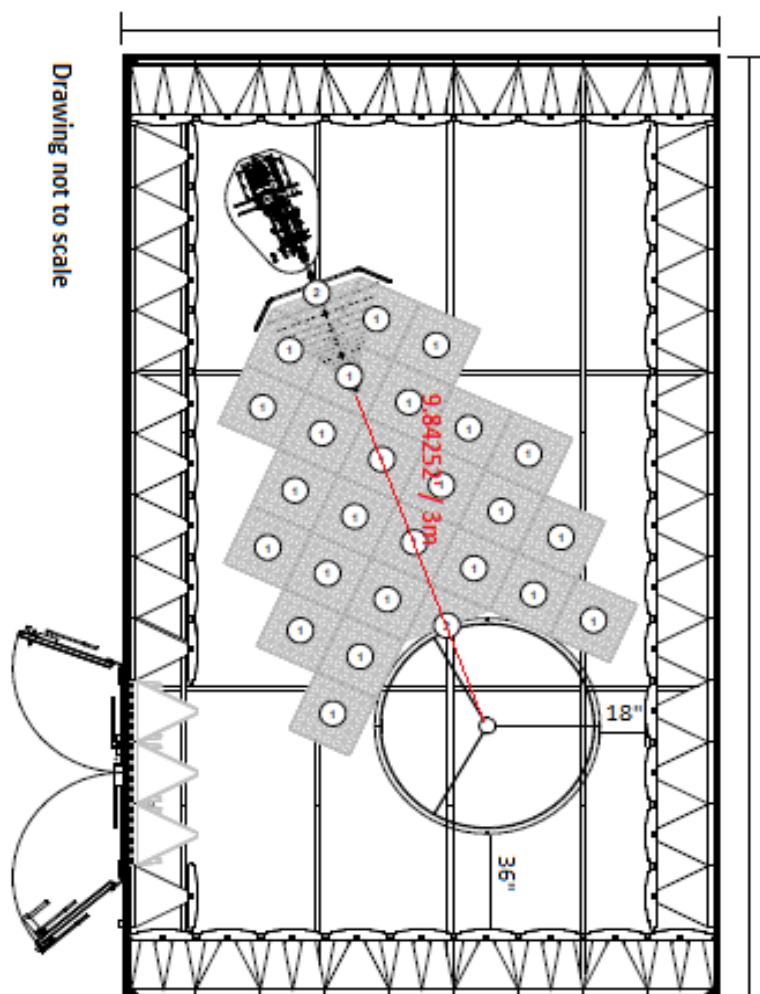
Notes: √ meets the requirements of the acceptance criteria.

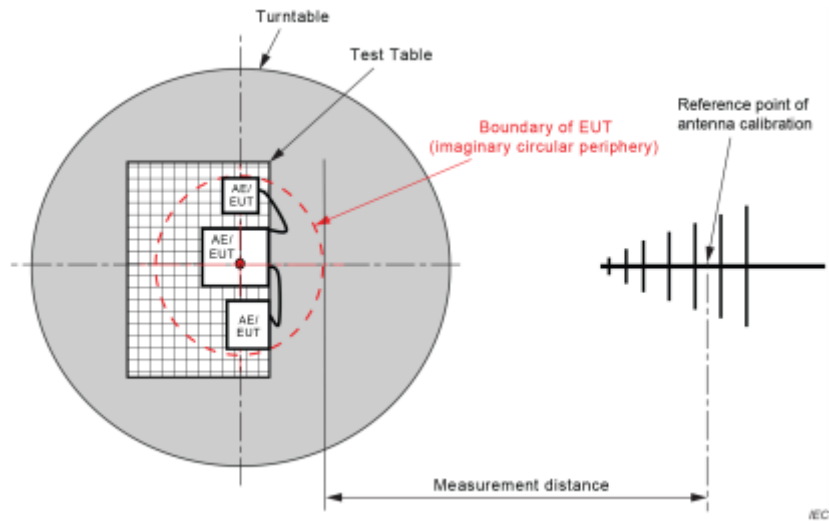
5.2 Test Setup

Semi-Anechoic Chamber Test Site-3 meter

Chamber Location	815 N Opdyke Rd Auburn Hills, Michigan 48326
Chamber Manufacturer:	ETS-Lindgren
Chamber Type	Semi-Anechoic
Model	FACT™ 3-2.0 Plus
Chamber Dimensions (L x W x H)	18'x18'x30'
Quiet Zone Diameter	2.0 meters
Quiet Zone Test Heights	1 & 2 meters (front only)
Test Distance	3.0 meters
Test Frequency Range	1-40 GHz
Measured Performance	4.87 dB Site sVSWR

Chamber Dimensions





5.3 Test Equipment Used

ID #	Equipment	Manufacturer	Model #	Serial #	Cal Due
BVD0217	Receiver 2Hz-44GHz	Rohde & Schwarz	ESW44	101871	4/21/2025
BVD0118	Antenna Mast Position Controller	ETS	7006-001	00214778/00214648	N/A
BVD0111	3 Meter Anechoic Chamber	ETS	N/A	N/A	N/A
BVD0247	Turn Table	ETS	920250	N/A	N/A
BVD0323	Foam Test Table For 3 Meter Chamber	ETS-Lindgren	LDT-1.5	N/A	N/A
BVD0069	Bore Sight Tower	ETS	2171B	226732	N/A
BVD0312	Optima 12V Blue top Marine battery	Optima	D34M	N/A	N/A
BVD0187	Preamplifier 25dB cal to 100kHz-1GHz	Rohde & Schwarz	TS-PR1	102080	1/23/2025
BVD0184	Preamplifier 29dB 1-18GHz	Rohde & Schwarz	TS-PR18	101646	6/20/2025
BVD0185	Preamplifier 45dB 18-40GHz	Rohde & Schwarz	TS-PR1840	100064	6/20/2025
BVD0011	Loop Antenna 9kHz-30MHz	Rohde & Schwarz	FMZB1519B	145	6/10/2025
BVD0021	UltraLog Antenna 30-6000MHz	Rohde & Schwarz	HL562E	101113	6/26/2025
BVD0267	Double Ridge Waveguide 800MHz-18GHz	Rohde & Schwarz	HF907	102832	6/27/2025
BVD0320	18-40GHz Horn Antenna	L3 Narda ATM	PNR 180-442-KF	136164-01	7/15/2025
BVD0045	Field Probe Mast	Rohde & Schwarz	TS-FPMA	N/A	N/A
BVD0481	Band Reject Filter 40dB from 5150 to 5880MHz	Micro-Tronics	BRM50716	G336	6/17/2025
BVD0394	Double Shielded N-Type Cable 6.9 Meter	Rohde & Schwarz	N-Type	N/A	4/8/2025
BVD0398	Double Shielded N-Type Cable 2 Meter	Rohde & Schwarz	N-Type	N/A	4/8/2025
BVD0563	RF Cable Assembly	Huber+Suhner, inc	SUCOFLEX 102A	502215/2A	10/17/2024
BVD0407	Double Shielded N-Type Cable 410mm (For PreAmp)	Rohde & Schwarz	N-Type	N/A	10/15/2025
BVD0495	SMA Shielded Cable approx 100mm (for Pre-Amp)	Rohde & Schwarz	SMA-Type	N/A	7/15/2025
BVD0587	Double Shielded N-Type Cable 440mm (For PreAmp)	Winchester Interconnect	250-251-660157 REV A	N/A	1/9/2025
BVD0229	Temp and Humidity Meter	Fluke	971	12001009	5/23/2025

Equipment List (Software)

ID #	Equipment	Manufacturer	Model	Version No.	
N/A	EMC Test Software	Rodhe & Schwarz	EMC32	11.20.00	N/A

Customer Supplied Equipment

ID #	Equipment	Manufacturer	Model	Serial #	Version No.
N/A	Harness	Harman	N/A	N/A	N/A
N/A	Display Unit	MOBIS	BMM6100000	231107 01	N/A
N/A	Shark Fin Antenna	Alfa Romeo	B901	719147	N/A
N/A	Antenna	Aptiv	APN35409682	N/A	N/A
N/A	Camera	N/A	23295906C	N/A	N/A
N/A	MFGBridge_Tool/Dut labtool	N/A	N/A	N/A	2.0.0.89

5.4 Test Limits and Procedure

Radiated emissions that fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a)

Frequencies (MHz)	Field strength ($\mu\text{V/m}$)	Field strength (dB $\mu\text{V/m}$)	Measurement distance (meters)
0.009 ~ 0.490	2400/F(kHz)	48.5 - 13.8	300
0.490 ~ 1.705	24000/F(kHz)	33.8 - 23	30
1.705 ~ 30.0	30	29.54	30
30 ~ 88	100	40.0	3
88 ~ 216	150	43.5	3
216 ~ 960	200	46.0	3
Above 960	500	54.0	3

Note:

- The lower limit shall apply at the transition frequencies.
- For performing measurements at a specified distance of 3m, the values are extrapolated using extrapolation factor.
Frequencies below 30MHz are extrapolated using 40dB/decade.
Frequencies above 30MHz are extrapolated using 20dB/decade.

Frequencies (MHz)	Formula for Limits derivation for below 30MHz	Limits for frequencies below 30MHz (dB $\mu\text{V/m}$)
0.009 ~ 0.490	2400/F(kHz) + 40 Log (300m/3m)	128.5 ~ 93.8
0.490 ~ 1.705	24000/F(kHz) + 40 Log (30m/3m)	73.8 ~ 62.96
1.705 ~ 30.0	29.54 + 40 Log (30m/3m)	69.54

- For frequencies above 1000MHz, the field strength limits based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 30dB under any condition of modulation.

The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω .

The measurement procedures are as per **789033 D02 General UNII Test Procedures New Rules v02r01, ISED RSS-247 6.2**

The Limits for Unwanted emissions out of the Restricted Bands are as follows.

Procedure	Limits	
	Peak (dBμV/m)	Average (dBμV/m)
KDB 789033 D02 General UNII Test Procedures New Rules v02r01	74	54

§ 15.407

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (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 e.i.r.p. 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 e.i.r.p. of -27 dBm/MHz.
- (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 e.i.r.p. of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725–5.85 GHz band:
 - (i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Procedure	Peak Limit (dBμV/m)
15.407(b)(1)	68.23
15.407(b)(2)	
15.407(b)(3)	
15.407(b)(4)	As stated above

1. The table height for emissions measurements
 - i) Below 1 GHz, the table height is 80 cm above the reference ground plane.
 - ii) Above 1 GHz, the table height is 1.5 m
2. Measurements performed with the EUT rotated from 0° to 360°, the antenna height scanned between 1m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

5.5 EMI Test Receiver/Spectrum Analyzer Settings

Below 1GHz

Frequency	RBW	Detector
9KHz to 30MHz	9KHz	Peak

Frequency	RBW	Detector
30MHz to 1GHz	120KHz	Peak/Quasi Peak

Above 1GHz

Frequency	RBW	Detector
1GHz to 40GHz	1 MHz	Peak/ Power Averaging (RMS)

Note: Trace average is 100 traces for continuous transmission else the traces shall be increased by a factor of $1/x$, where x is the duty cycle. Duty cycle $> 98\%$ no correction factor needed and for Duty cycle $< 98\%$ the correction factor $10 \log (1/x)$, where x is the duty cycle.

5.6 Test Data

Uncertainty

Radiated Emissions (30MHz to 40GHz)

Test Engineer Initials: AP/AB

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

30MHz to 1GHZ

Source of Uncertainty	Value (dB)	ProbabilityDistribution	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	2.449	1	0.1768033
NSA Calibration	4.0	Triangular	1.414	1	1.633332
ETS Foam Table (LDT-1.5)	1.8	Rectangular	1.732	1	1.039261
Combined Standard Uncertainty (square root of the sum of the squares)					2.113781
Expanded Uncertainty (K=2)					4.227562

The total derived measurement uncertainty is +/- 4.228 dB

1GHz to 40GHz

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	0.105000
Filter Insertion Loss	0.25	Normal	2	1	0.125000
Antenna Factor	0.65	Normal	2	1	0.325000
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.866051
PRF Response	1.5	Rectangular	1.732	1	0.866051
Mismatch Filter – Receiver	0.25	U-Shape	1.414	1	0.176803
VSWR Calibration	2.0	Triangular	2.449	1	0.816659
ETS Foam Table (LDT-1.5)	1.8	Rectangular	1.732	1	1.039261
Combined Standard Uncertainty (square root of the sum of the squares)					1.869213
Expanded Uncertainty (K=2)					3.738426

The total derived measurement uncertainty is +/- 3.738 dB.

Remarks:

1. Level Q-Peak Reading (dBμV/m) = Raw Q-Peak Level + Correction Factor
2. Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
3. Margin = Level Q-Peak Reading – Limit

Remarks:

1. Level Peak Reading (dBμV/m) = Raw Peak Level + Correction Factor
2. Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
3. Margin = Level Peak Reading – Limit

Remarks:

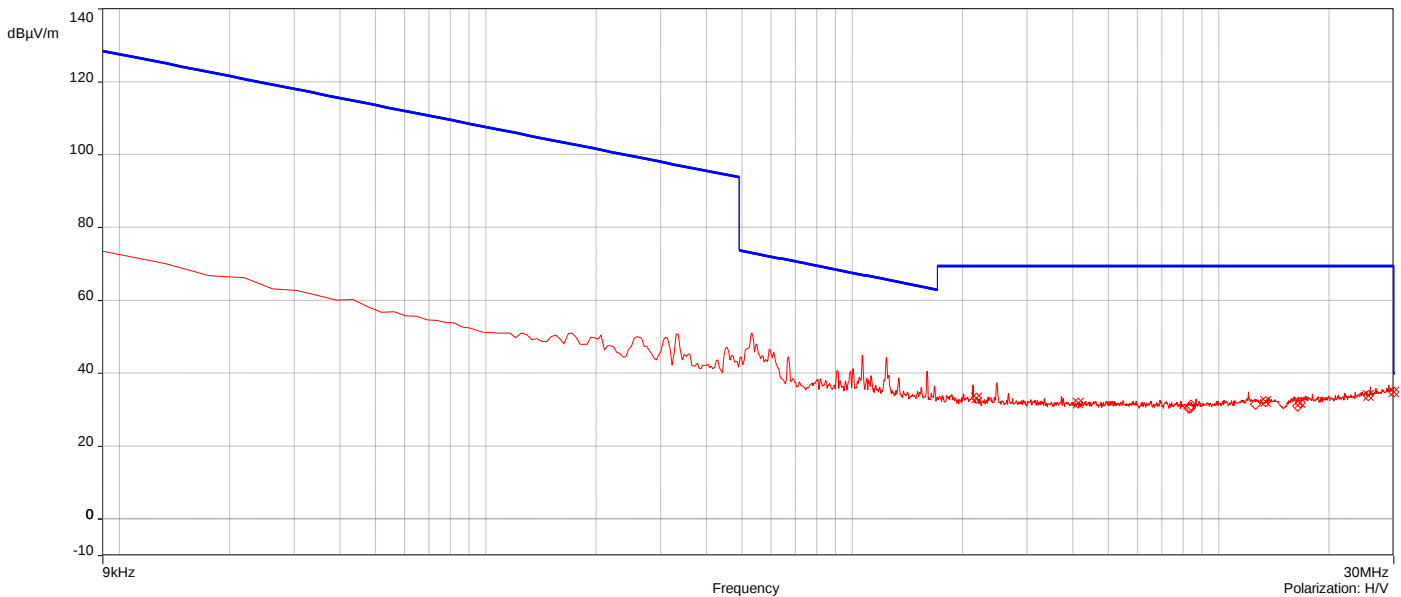
1. Level Average Reading (dBμV/m) = Raw Average Level + Correction Factor
2. Correction Factor (dB) = Antenna Factor + Cable Loss – Preamplifier Gain
3. Margin = Level Average Reading – Limit

J23133_5G_UNII-1 802.11a_6Mbps_Ch 40_9kHz-30MHz_Ground-Parallel

10/4/2024 12:06:09 PM

No	Frequency (MHz)	Level Q-Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.177231MHz	33.18	19.59	69.54	-36.36	1.00	123.70	H/V	Passed
2.	4.126924MHz	31.76	19.74	69.54	-37.78	1.00	256.40	H/V	Passed
3.	13.404037MHz	32.22	19.90	69.54	-37.32	1.00	100.20	H/V	Passed
4.	16.694949MHz	32.04	20.11	69.54	-37.50	1.00	0.10	H/V	Passed
5.	25.594978MHz	33.99	21.15	69.54	-35.55	1.00	243.30	H/V	Passed
6.	30MHz	34.89	22.04	40.00	-5.11	1.00	110.90	H/V	Passed

Overall Graphs:

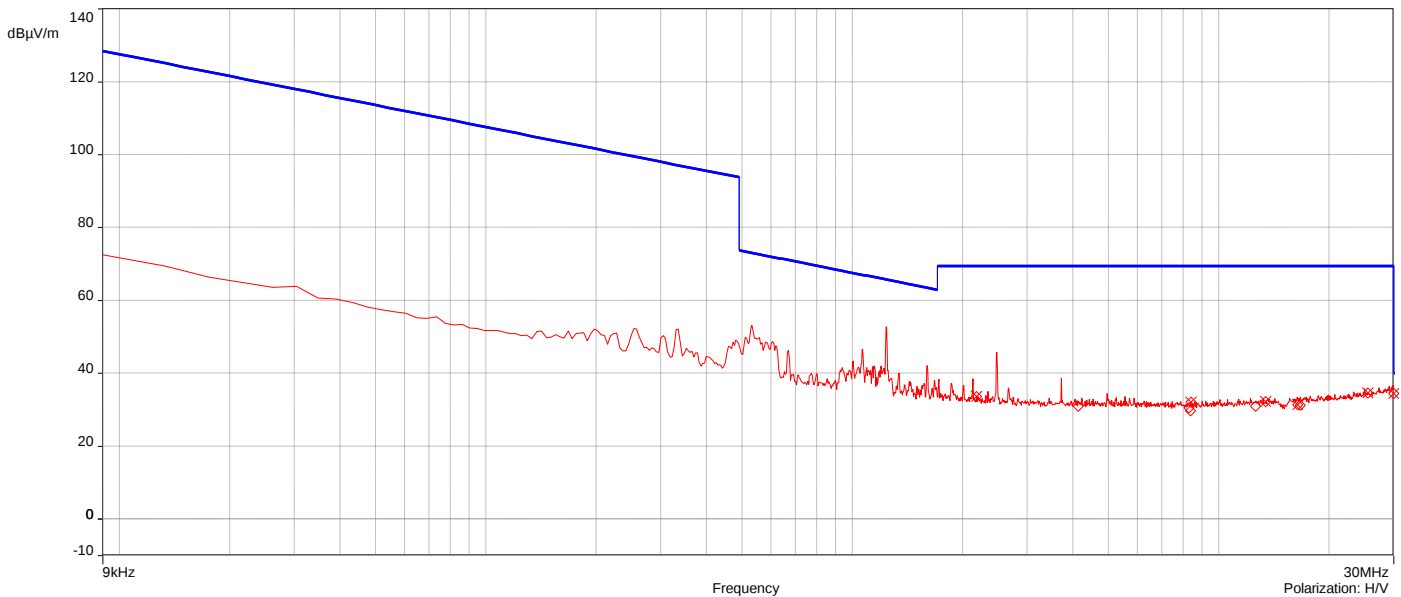


J23133_5G UNII-1 802.11a_6Mbps_Ch 40_9kHz-30MHz_Parallel

10/4/2024 12:01:17 PM

No	Frequency (MHz)	Level Q-Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.181516MHz	33.60	19.59	69.54	-35.94	1.00	130.00	H/V	Passed
2.	8.377685MHz	32.17	19.52	69.54	-37.37	1.00	303.90	H/V	Passed
3.	13.395467MHz	32.23	19.90	69.54	-37.31	1.00	291.50	H/V	Passed
4.	16.420706MHz	31.45	20.07	69.54	-38.09	1.00	257.30	H/V	Passed
5.	25.522132MHz	34.60	21.14	69.54	-34.94	1.00	358.90	H/V	Passed
6.	30MHz	34.41	22.04	40.00	-5.59	1.00	355.10	H/V	Passed

Overall Graphs:

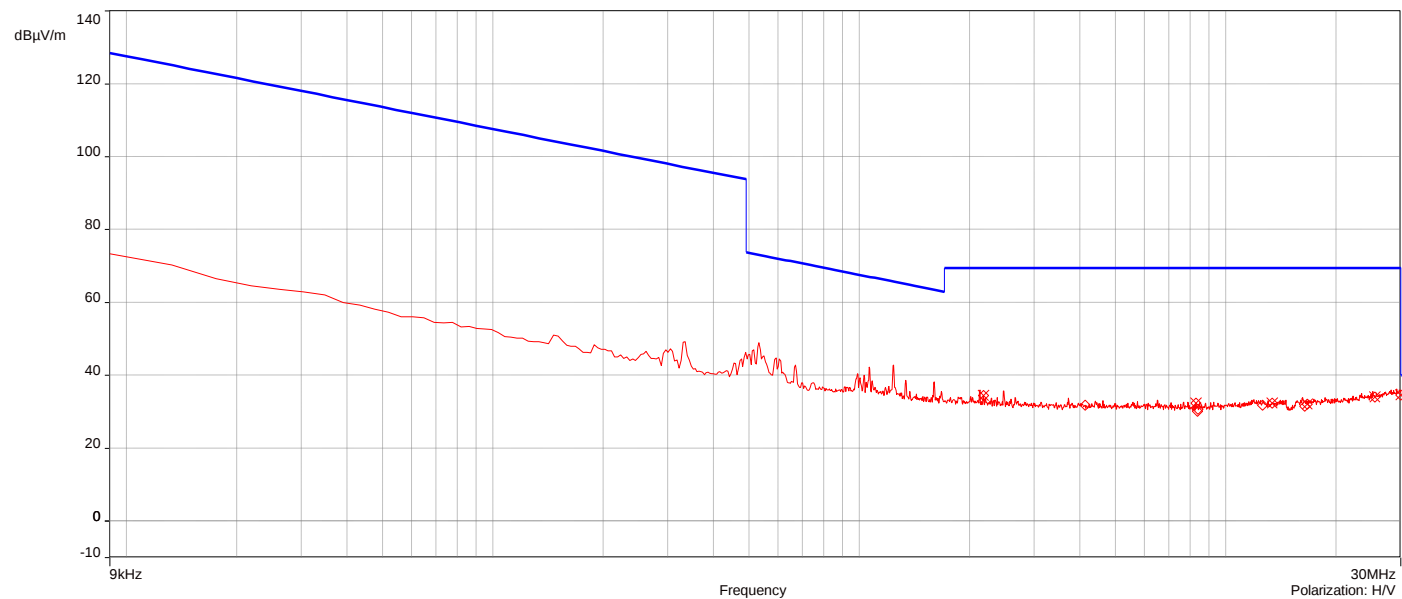


J23133_5G UNII-1 802.11a_6Mbps_Ch 40_9kHz-30MHz_Perpendicular

10/4/2024 11:57:49 AM

No	Frequency (MHz)	Level Q-Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.177231MHz	34.49	19.59	69.54	-35.05	1.00	13.10	H/V	Passed
2.	8.291984MHz	32.38	19.53	69.54	-37.16	1.00	51.20	H/V	Passed
3.	13.365472MHz	32.36	19.90	69.54	-37.18	1.00	11.40	H/V	Passed
4.	16.694949MHz	32.14	20.11	69.54	-37.40	1.00	40.80	H/V	Passed
5.	25.509277MHz	34.08	21.14	69.54	-35.46	1.00	262.00	H/V	Passed
6.	30MHz	34.68	22.04	40.00	-5.32	1.00	337.10	H/V	Passed

Overall Graphs:

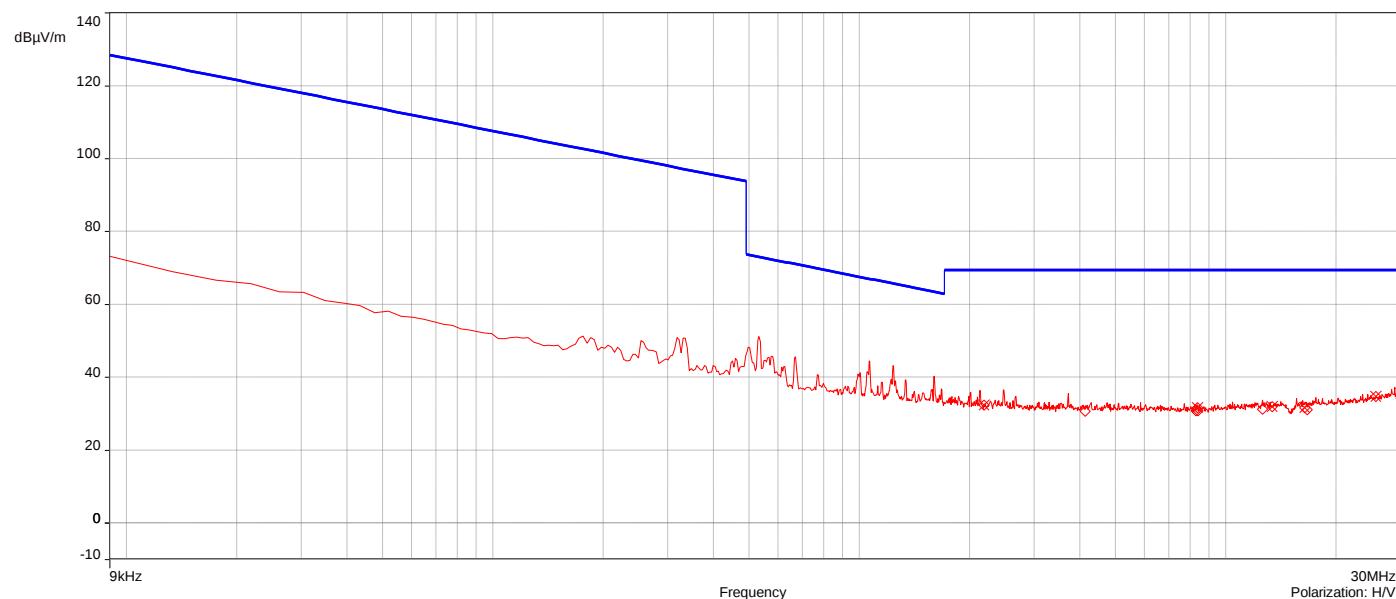


J23133_5G UNII-1 802.11n MCS0_Ch 40_9kHz-30MHz_Ground-Parallel

10/4/2024 12:18:07 PM

No	Frequency (MHz)	Level Q-Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.190086MHz	32.39	19.59	69.54	-37.15	1.00	226.30	H/V	Passed
2.	8.364829MHz	31.68	19.52	69.54	-37.86	1.00	273.70	H/V	Passed
3.	13.369757MHz	32.00	19.90	69.54	-37.54	1.00	308.00	H/V	Passed
4.	16.420706MHz	31.68	20.07	69.54	-37.86	1.00	126.80	H/V	Passed
5.	25.620688MHz	34.75	21.15	69.54	-34.79	1.00	124.50	H/V	Passed
6.	30MHz	35.65	22.04	40.00	-4.35	1.00	243.50	H/V	Passed

Overall Graphs:

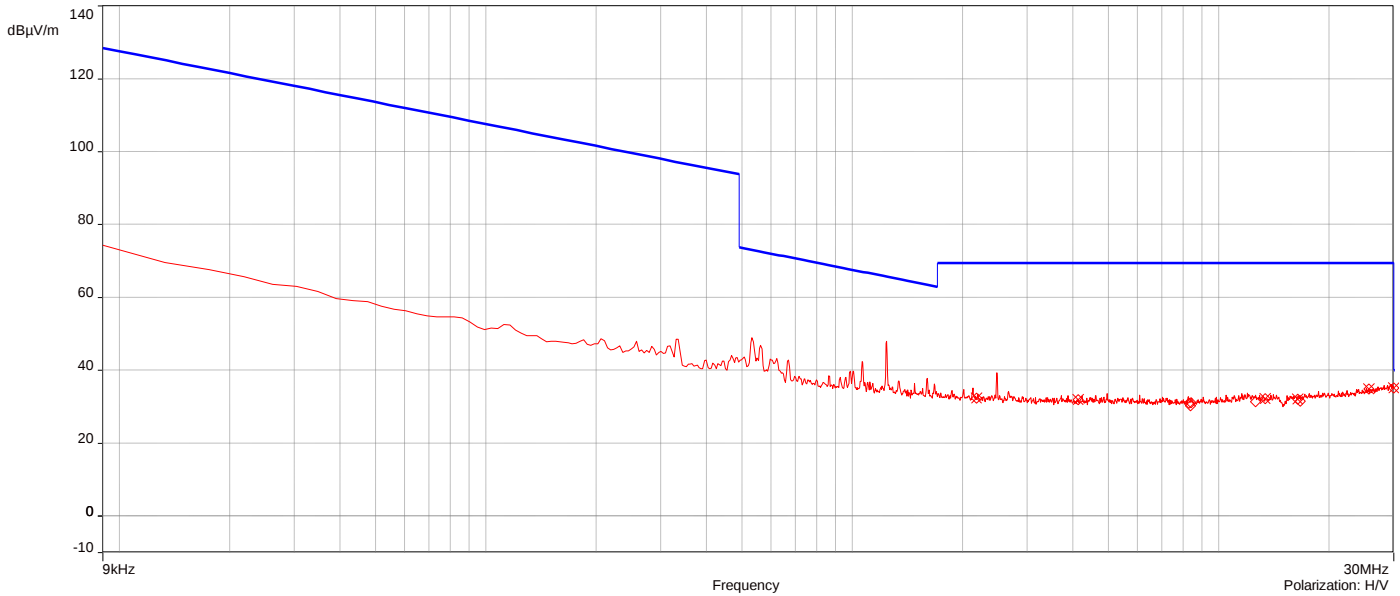


J23133_5G UNII-1 802.11n MCS0_Ch 40_9kHz-30MHz_Parallel

10/4/2024 12:51:11 PM

No	Frequency (MHz)	Level Q-Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.181516MHz	32.40	19.59	69.54	-37.14	1.00	224.60	H/V	Passed
2.	4.126924MHz	31.93	19.74	69.54	-37.61	1.00	241.50	H/V	Passed
3.	13.365472MHz	32.28	19.90	69.54	-37.26	1.00	165.10	H/V	Passed
4.	16.420706MHz	32.05	20.07	69.54	-37.49	1.00	199.00	H/V	Passed
5.	25.659254MHz	34.88	21.15	69.54	-34.66	1.00	358.00	H/V	Passed
6.	30MHz	35.22	22.04	40.00	-4.78	1.00	114.50	H/V	Passed

Overall Graphs:

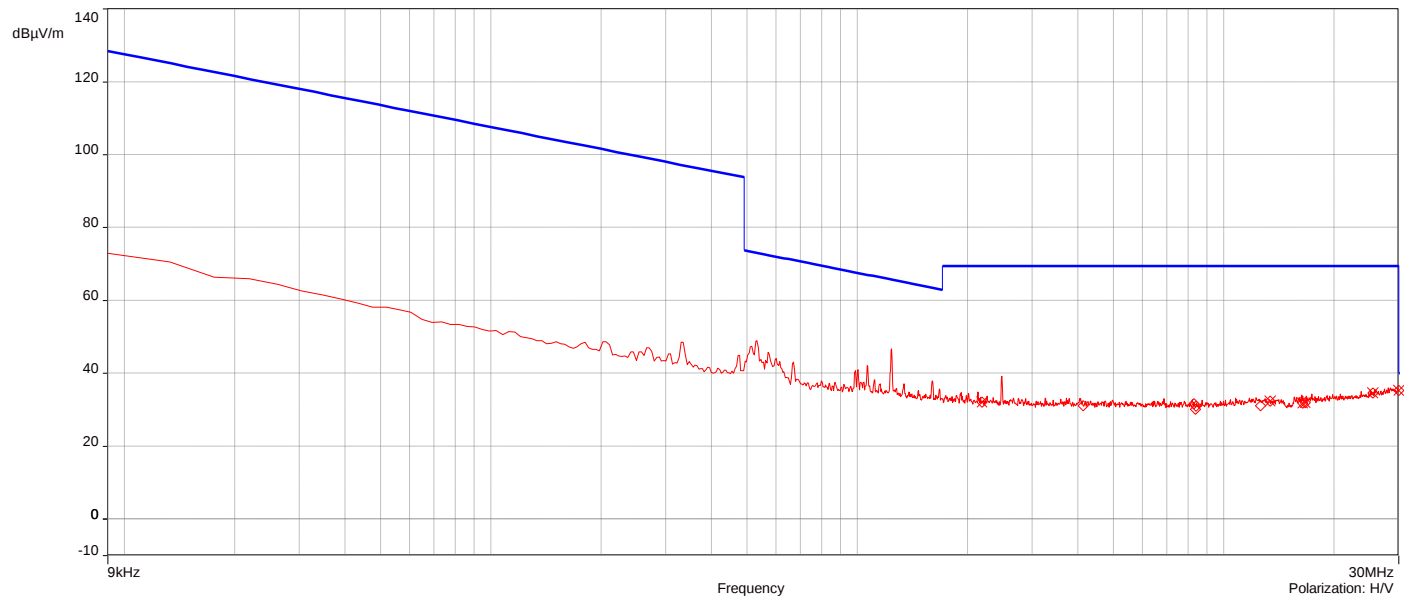


J23133_5G_UNII-1 802.11n_MCS0_Ch 40_9kHz-30MHz_Perpendicular

10/4/2024 12:20:25 PM

No	Frequency (MHz)	Level Q-Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.190086MHz	32.16	19.59	69.54	-37.38	1.00	3.00	H/V	Passed
2.	13.382612MHz	32.34	19.90	69.54	-37.20	1.00	23.10	H/V	Passed
3.	16.420706MHz	31.84	20.07	69.54	-37.70	1.00	87.20	H/V	Passed
4.	16.694949MHz	31.93	20.11	69.54	-37.61	1.00	57.70	H/V	Passed
5.	25.530703MHz	34.56	21.14	69.54	-34.98	1.00	358.90	H/V	Passed
6.	30MHz	35.33	22.04	40.00	-4.67	1.00	358.90	H/V	Passed

Overall Graphs:

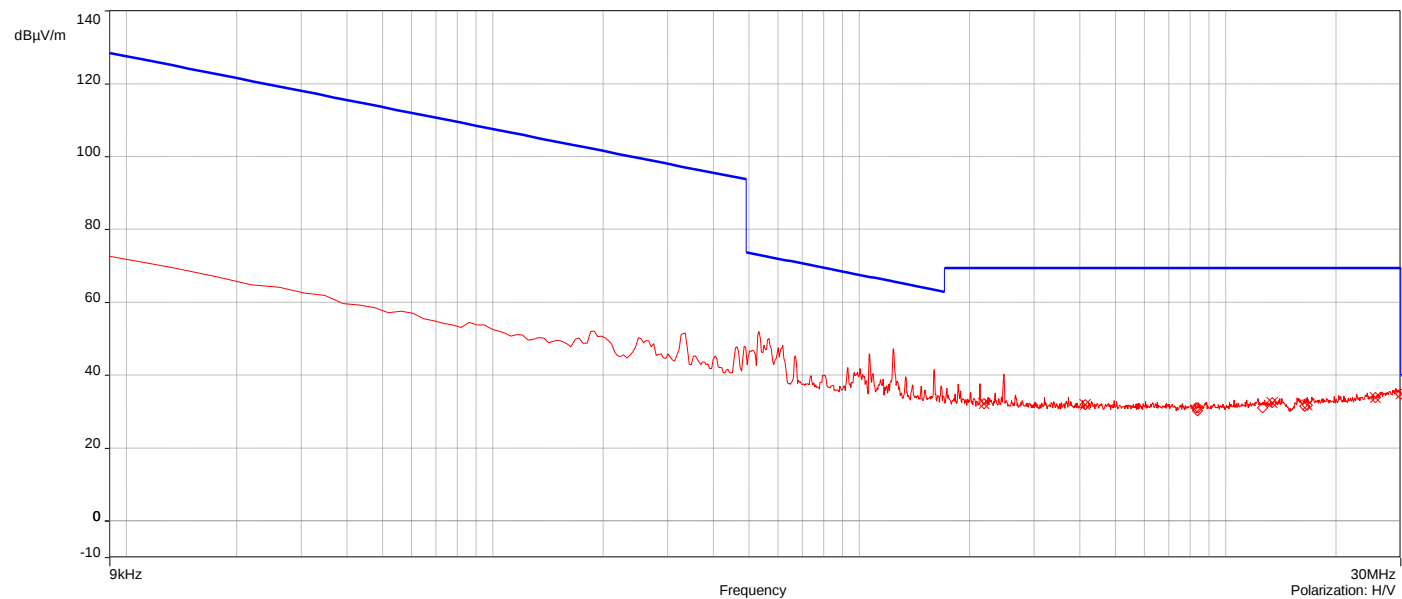


J23133_5G UNII-3 802.11a_6Mbps_Ch 157_9kHz-30MHz_Ground-Parallel

10/4/2024 12:26:23 PM

No	Frequency (MHz)	Level Q-Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.190086MHz	32.22	19.59	69.54	-37.32	1.00	156.90	H/V	Passed
2.	4.126924MHz	31.98	19.74	69.54	-37.56	1.00	45.20	H/V	Passed
3.	13.365472MHz	32.50	19.90	69.54	-37.04	1.00	1.10	H/V	Passed
4.	16.694949MHz	31.79	20.11	69.54	-37.75	1.00	349.30	H/V	Passed
5.	25.552128MHz	33.91	21.15	69.54	-35.63	1.00	5.70	H/V	Passed
6.	30MHz	34.90	22.04	40.00	-5.10	1.00	154.90	H/V	Passed

Overall Graphs:

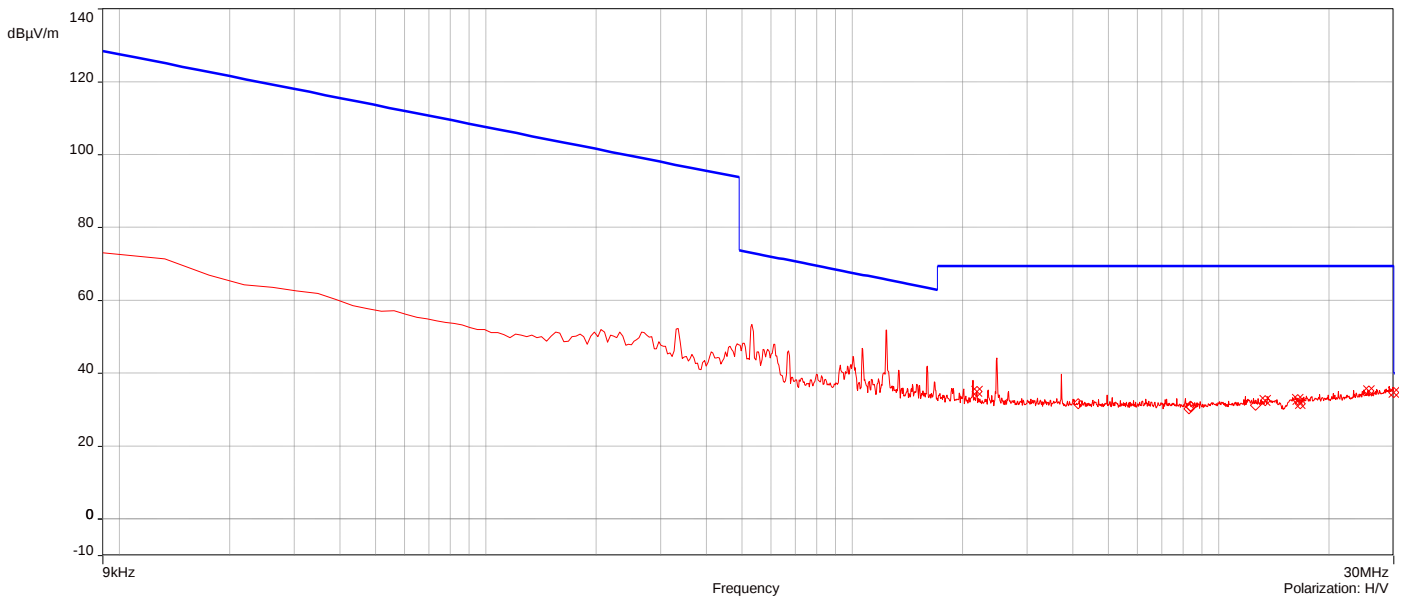


J23133_5G UNII-3 802.11a_6Mbps_Ch 157_9kHz-30MHz_Parallel

10/4/2024 12:29:37 PM

No	Frequency (MHz)	Level Q-Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.185801MHz	35.02	19.59	69.54	-34.52	1.00	126.70	H/V	Passed
2.	13.382612MHz	32.57	19.90	69.54	-36.97	1.00	214.90	H/V	Passed
3.	16.420706MHz	32.79	20.07	69.54	-36.75	1.00	79.70	H/V	Passed
4.	16.694949MHz	31.70	20.11	69.54	-37.84	1.00	11.80	H/V	Passed
5.	25.642114MHz	35.17	21.15	69.54	-34.37	1.00	146.10	H/V	Passed
6.	30MHz	34.73	22.04	40.00	-5.27	1.00	0.10	H/V	Passed

Overall Graphs:

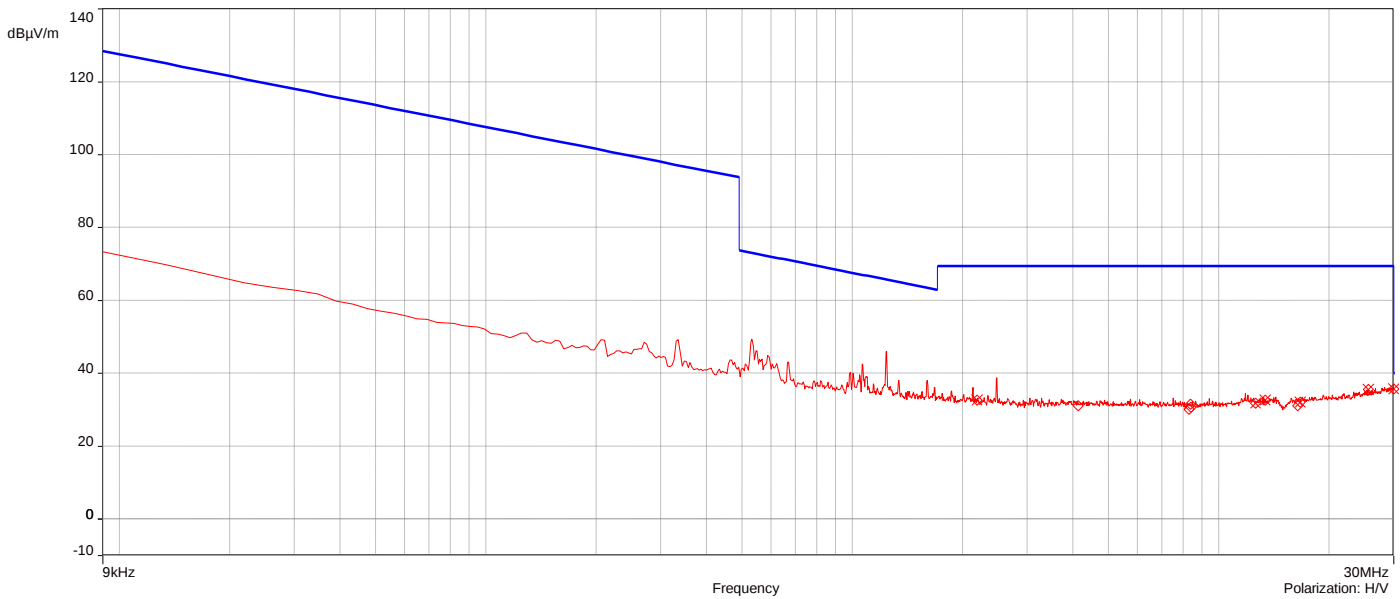


J23133_5G UNII-3 802.11a_6Mbps_Ch 157_9kHz-30MHz_Perpendicular

10/4/2024 12:23:44 PM

No	Frequency (MHz)	Level Q-Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.190086MHz	32.63	19.59	69.54	-36.91	1.00	135.40	H/V	Passed
2.	12.577024MHz	31.86	19.84	69.54	-37.68	1.00	296.20	H/V	Passed
3.	13.361187MHz	32.63	19.90	69.54	-36.91	1.00	86.00	H/V	Passed
4.	16.694949MHz	32.10	20.11	69.54	-37.44	1.00	25.90	H/V	Passed
5.	25.569268MHz	35.58	21.15	69.54	-33.96	1.00	239.10	H/V	Passed
6.	30MHz	35.77	22.04	40.00	-4.23	1.00	34.60	H/V	Passed

Overall Graphs:

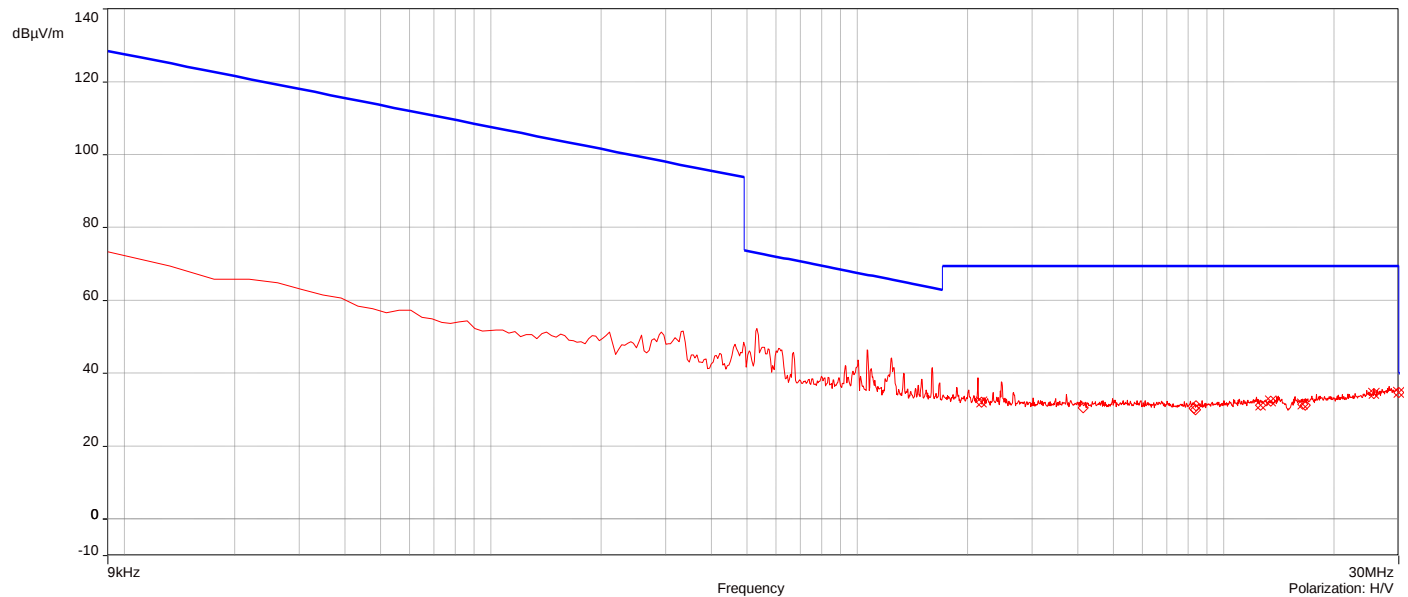


J23133_5G UNII-3 802.11n MCS0_Ch 157_9kHz-30MHz_Ground-Parallel

10/4/2024 12:41:09 PM

No	Frequency (MHz)	Level Q-Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.181516MHz	32.09	19.59	69.54	-37.45	1.00	221.30	H/V	Passed
2.	12.577024MHz	31.34	19.84	69.54	-38.20	1.00	0.10	H/V	Passed
3.	13.395467MHz	32.32	19.90	69.54	-37.22	1.00	4.80	H/V	Passed
4.	16.420706MHz	31.54	20.07	69.54	-38.00	1.00	333.20	H/V	Passed
5.	25.642114MHz	34.44	21.15	69.54	-35.10	1.00	0.10	H/V	Passed
6.	30MHz	34.83	22.04	40.00	-5.17	1.00	84.40	H/V	Passed

Overall Graphs:

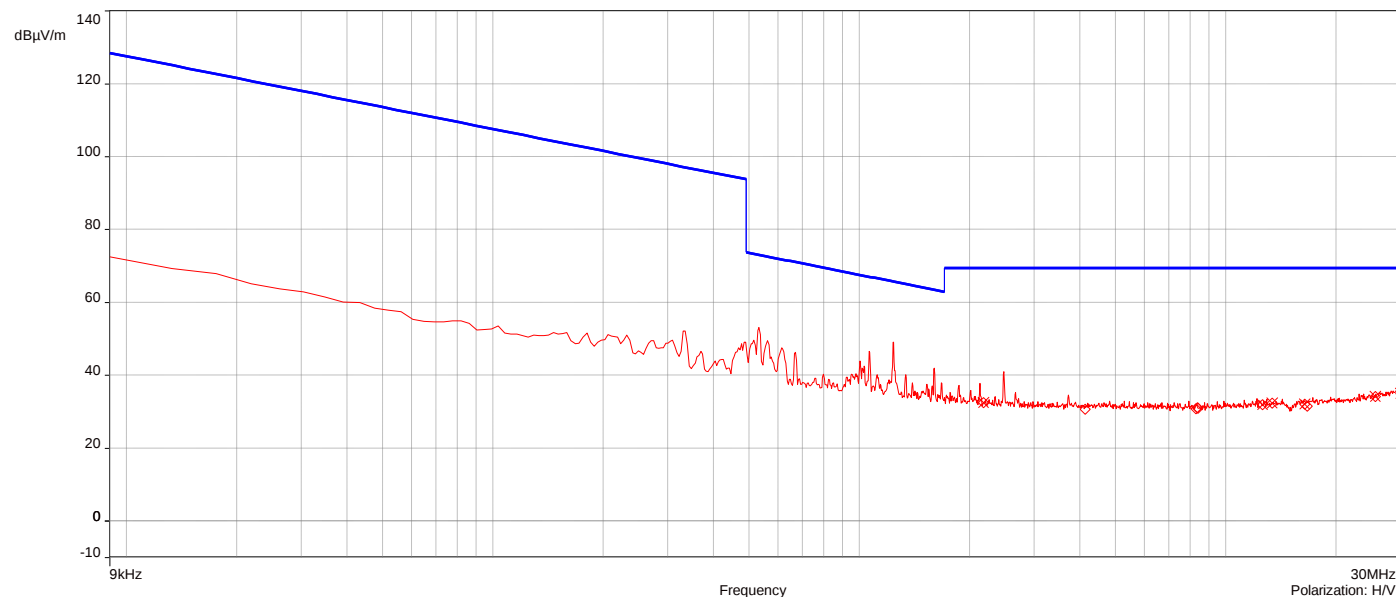


J23133_5G UNII-3 802.11n MCS0_Ch 157_9kHz-30MHz_Parallel

10/4/2024 12:32:43 PM

No	Frequency (MHz)	Level Q-Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.177231MHz	32.59	19.59	69.54	-36.95	1.00	87.70	H/V	Passed
2.	12.577024MHz	31.96	19.84	69.54	-37.58	1.00	257.40	H/V	Passed
3.	13.374042MHz	32.33	19.90	69.54	-37.21	1.00	222.80	H/V	Passed
4.	16.420706MHz	32.08	20.07	69.54	-37.46	1.00	276.60	H/V	Passed
5.	25.590693MHz	34.15	21.15	69.54	-35.39	1.00	1.70	H/V	Passed
6.	30MHz	35.06	22.04	40.00	-4.94	1.00	173.70	H/V	Passed

Overall Graphs:

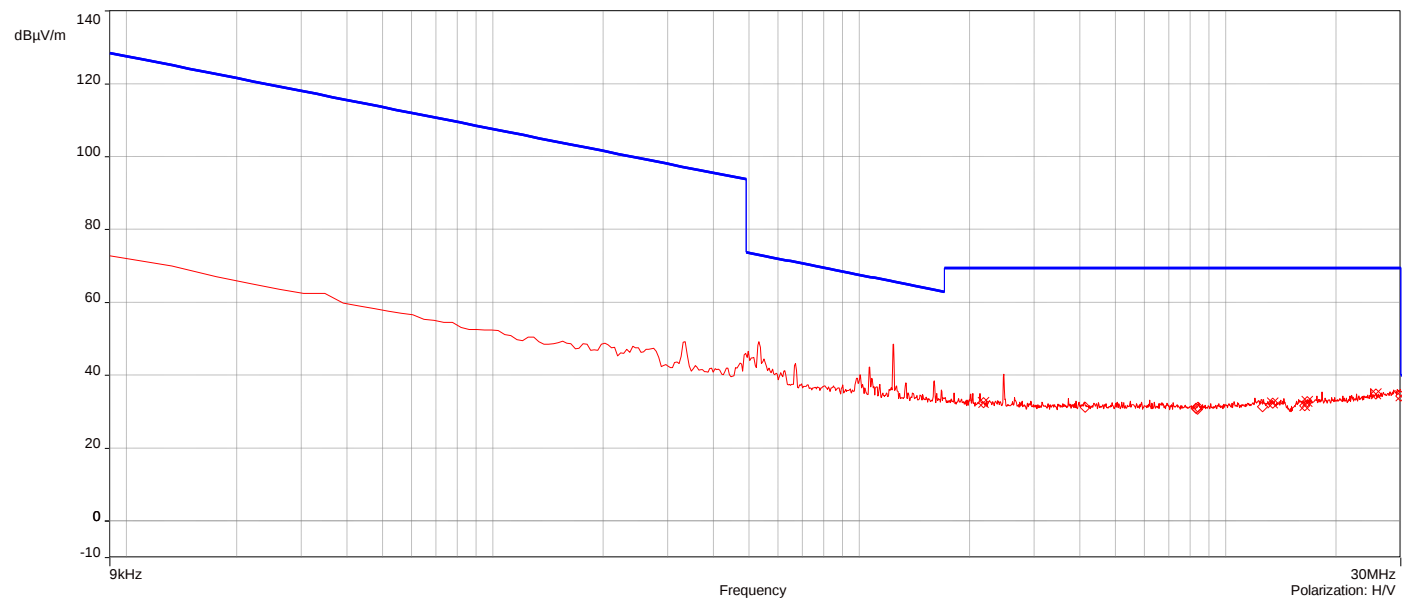


J23133_5G UNII-3 802.11n MCS0_Ch 157_9kHz-30MHz_Perpendicular

10/4/2024 12:48:30 PM

No	Frequency (MHz)	Level Q-Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	2.181516MHz	32.52	19.59	69.54	-37.02	1.00	40.80	H/V	Passed
2.	13.408322MHz	32.37	19.91	69.54	-37.17	1.00	350.00	H/V	Passed
3.	16.420706MHz	31.74	20.07	69.54	-37.80	1.00	173.10	H/V	Passed
4.	16.694949MHz	32.82	20.11	69.54	-36.72	1.00	262.30	H/V	Passed
5.	25.620688MHz	34.88	21.15	69.54	-34.66	1.00	324.80	H/V	Passed
6.	30MHz	34.40	22.04	40.00	-5.60	1.00	277.70	H/V	Passed

Overall Graphs:

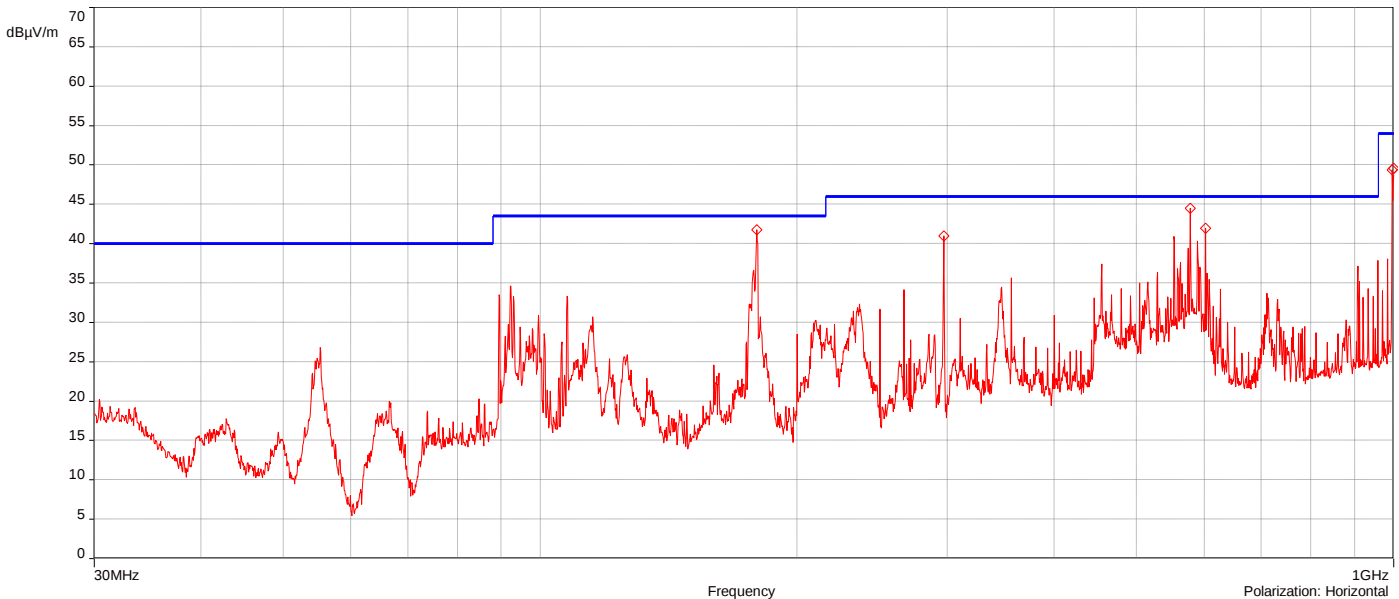


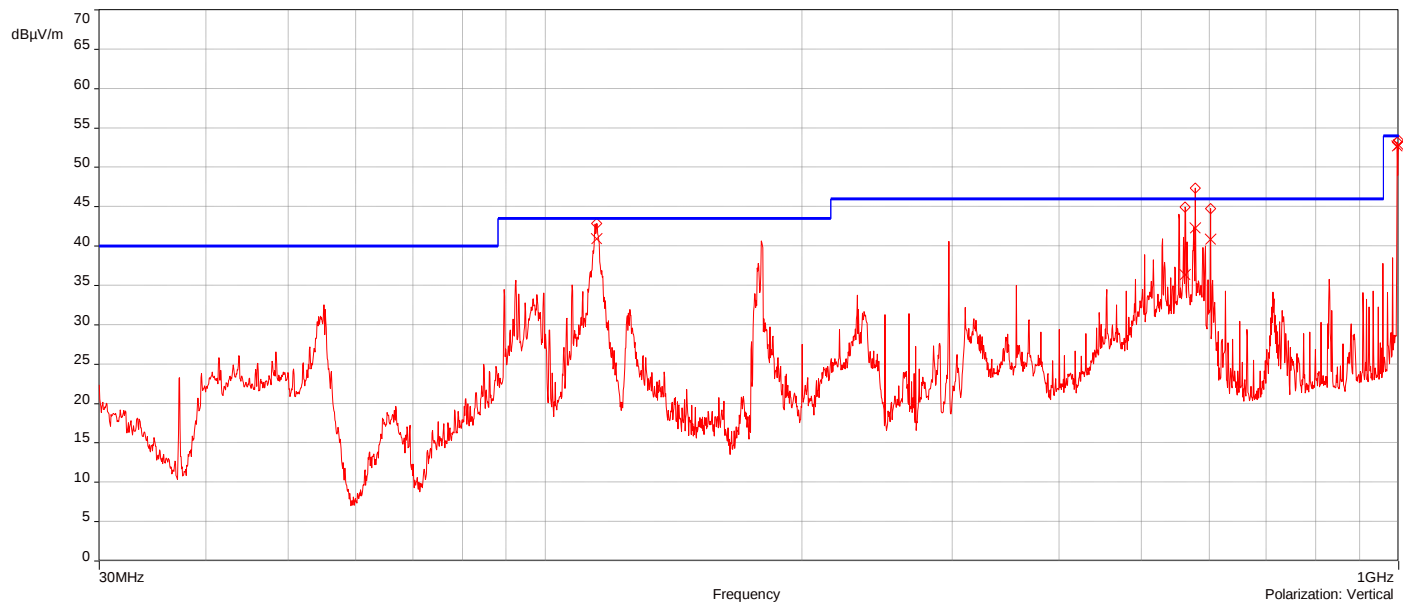
J23133#2_5G UNII-1 802.11a_6Mbps_Ch 36_30MHz-1GHz

10/2/2024 9:10:24 PM

No	Frequency (MHz)	Level Q- Peak Reading (dBµV/m)	Correction Factor (dB)	Limit dBµV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	114.85146MHz	40.94	-11.77	43.50	-2.56	1.25	6.10	Vertical	Passed
2.	562.21895MHz	36.39	-6.32	46.00	-9.61	1.00	3.10	Vertical	Passed
3.	577.56868MHz	42.29	-5.79	46.00	-3.71	1.00	21.90	Vertical	Passed
4.	602.16248MHz	40.85	-5.24	46.00	-5.15	1.00	36.90	Vertical	Passed
5.	995.60621MHz	52.69	-0.22	54.00	-1.31	1.00	315.90	Vertical	Passed
6.	999.88588MHz	52.80	-0.09	54.00	-1.20	1.00	320.90	Vertical	Passed

Overall Graphs:



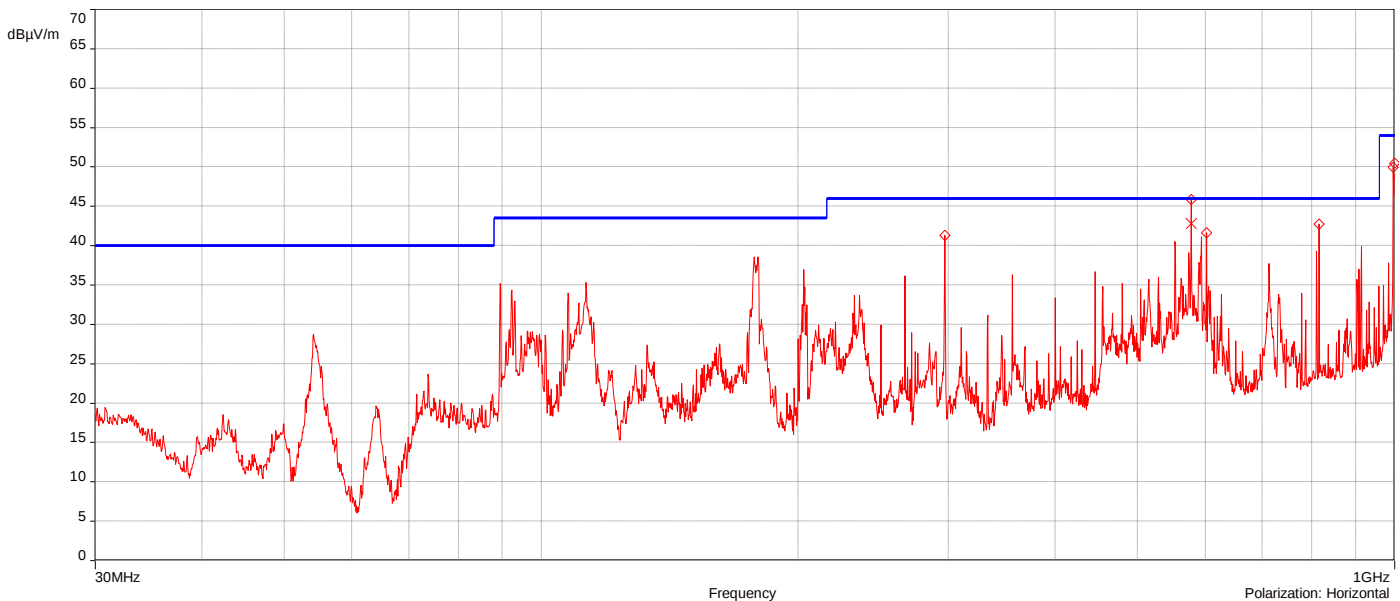


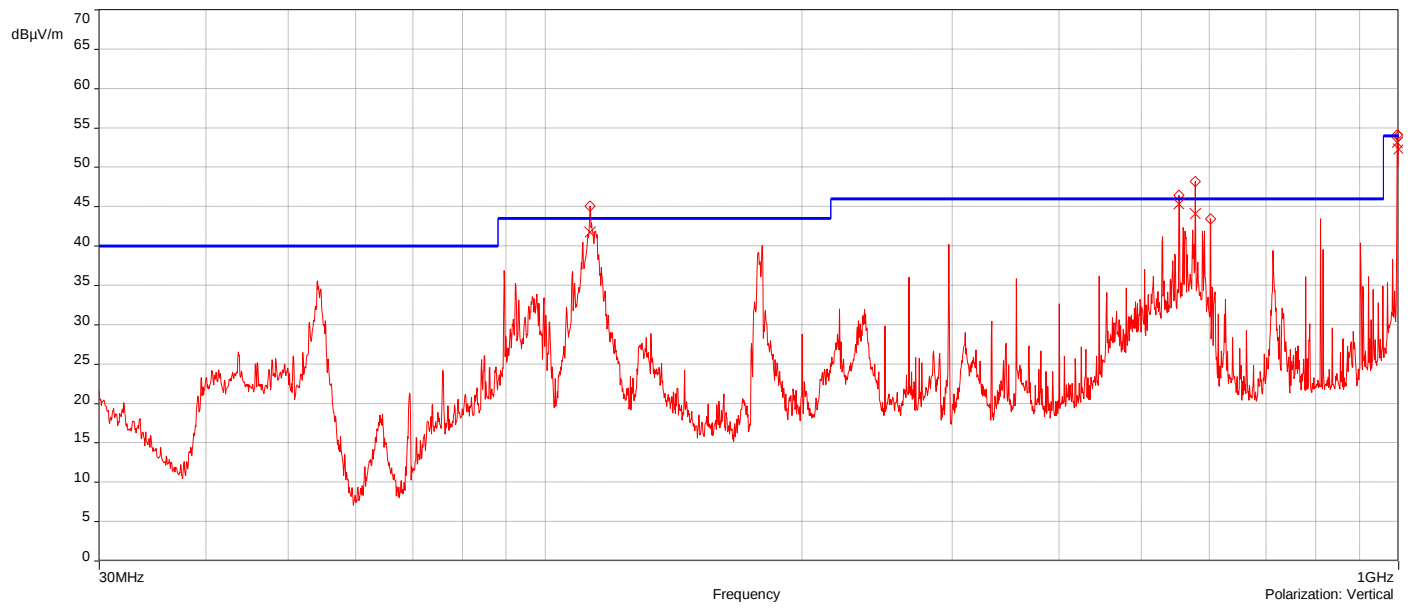
J23133#2_5G UNII-1 802.11n_MCS0_Ch 36_30MHz-1GHz

10/2/2024 10:01:21 PM

No	Frequency (MHz)	Level Q- Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	112.85429MHz	41.77	-11.76	43.50	-1.73	1.25	358.90	Vertical	Passed
2.	552.97488MHz	45.33	-6.43	46.00	-0.67	1.00	11.10	Vertical	Passed
3.	577.56868MHz	44.10	-5.79	46.00	-1.90	1.00	38.10	Vertical	Passed
4.	995.66327MHz	53.17	-0.22	54.00	-0.83	1.00	299.90	Vertical	Passed
5.	999.88588MHz	52.31	-0.09	54.00	-1.69	1.00	311.90	Vertical	Passed
6.	577.56868MHz	42.82	-4.73	46.00	-3.18	1.50	339.90	Horizontal	Passed

Overall Graphs:



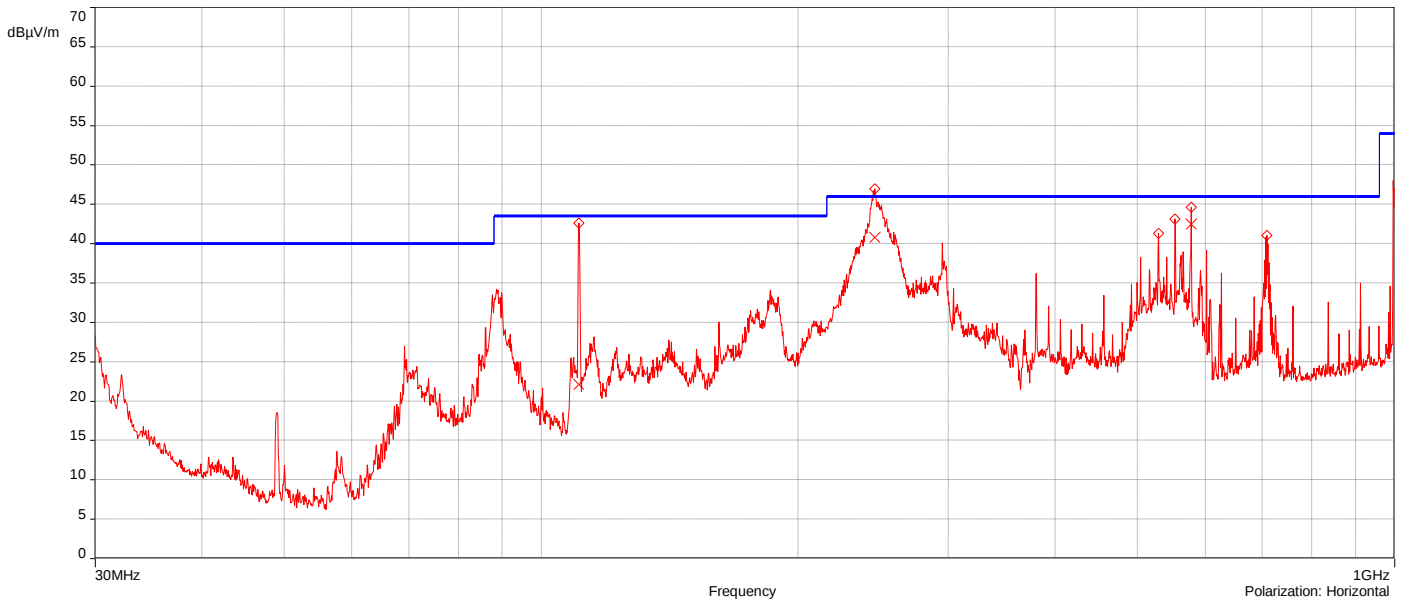


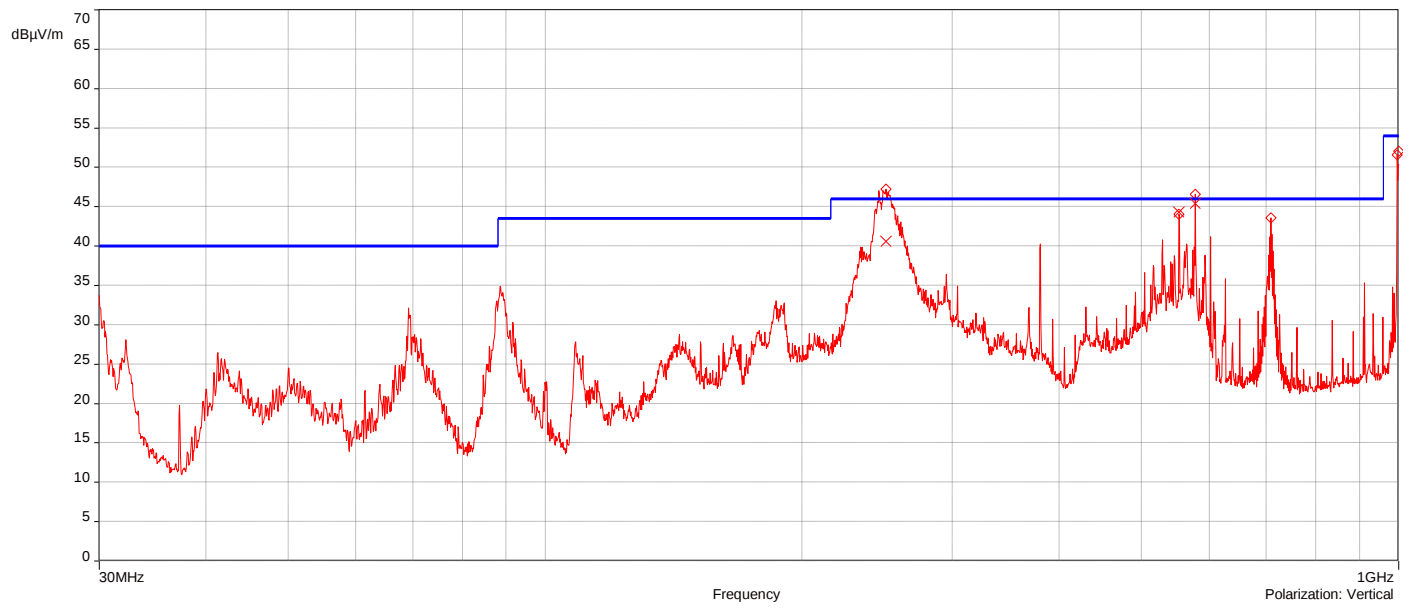
J23133#2_5G UNII-1 802.11ac_MCS0_Ch 38_30MHz-1GHz

10/3/2024 10:52:22 AM

No	Frequency (MHz)	Level Q- Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	250.54533MHz	40.58	-13.43	46.00	-5.42	1.00	214.10	Vertical	Passed
2.	552.97488MHz	44.28	-6.50	46.00	-1.72	1.00	0.10	Vertical	Passed
3.	577.56868MHz	45.42	-5.79	46.00	-0.58	1.00	9.90	Vertical	Passed
4.	110.62886MHz	22.12	-13.04	43.50	-21.38	3.75	358.90	Horizontal	Passed
5.	245.7521MHz	40.80	-13.05	46.00	-5.20	1.25	66.10	Horizontal	Passed
6.	577.56868MHz	42.49	-4.73	46.00	-3.51	1.50	138.10	Horizontal	Passed

Overall Graphs:





J23133#2_5G UNII-1 802.11ac_MCS0_Ch 42_30MHz-1GHz

10/3/2024 11:28:44 AM

No	Frequency (MHz)	Level Q-Peak Reading (dBμV/m)	Correction Factor (dB)	Limit dBμV/m	Margin (dB)	Height (m)	Angle (°)	Polarization	Judgement
1.	251.62951MHz	40.61	-13.43	46.00	-5.39	1.00	40.61	Vertical	Passed
2.	552.97488MHz	43.95	-6.50	46.00	-2.05	1.00	43.95	Vertical	Passed
3.	576.65569MHz	35.37	-5.83	46.00	-10.63	1.00	35.37	Vertical	Passed
4.	577.56868MHz	45.00	-5.79	46.00	-1.00	1.00	45.00	Vertical	Passed
5.	999.88588MHz	50.76	-0.14	54.00	-3.24	1.00	50.76	Vertical	Passed
6.	246.43685MHz	39.84	-13.05	46.00	-6.16	1.50	39.84	Horizontal	Passed

Overall Graphs:

