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TEST REPORT
(Class II Permissive Change)

Report Number: 104582174MPK-001
Project Number: G104582174
May 10, 2021

Testing performed on the
Communication Badge
Model Number: B3000n

FCC ID: QGZB3000N
IC: 4362A-B3000N

to
FCC Part 15 Subpart E (15.407)
Industry Canada RSS-247, Issue 2

For

Vocera Communications

Test Performed by:	**Test Authorized by:**
Intertek	Vocera Communications
1365 Adams Court	525 Race St, Ste 150
Menlo Park, CA 94025 USA	San Jose, CA 95126 USA

Prepared by: _____ **Date:** May 10, 2021
Anderson Soungpanya

Reviewed by: _____ **Date:** May 10, 2021
Krishna K Vemuri

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Report No. 104582174MPK-001	
Equipment Under Test:	Communication Badge
Trade Name:	Vocera Communications
Model Number:	B3000n
Applicant:	Vocera Communications
Contact:	Sonja Serrano
Address:	Vocera Communications 525 Race St, Ste 150 San Jose, CA 95126
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Tel. Number:	(408) 882-5100
Email:	sserrano@vocera.com
Applicable Regulation:	FCC Part 15, Subpart E (15.407) Industry Canada RSS-247, Issue 2
Date of Test:	February 12 – 22, 2021

We attest to the accuracy of this report:

Anderson Soungpanya
EMC Project Engineer

Krishna K Vemuri
EMC Manager

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1.0 Introduction

1.1 Summary of Tests

Test	Reference FCC	Reference RSS-247	Result
Conducted Output Power	15.407(a)(1)(2)(3)	RSS-247, 6.2	Complies
Transmitter Radiated Emissions	15.407(b)(1-8) 15.209, 15.205	RSS-247, 6.2	Complies

EUT receive date: February 12, 2021

EUT receive condition: The pre-production version of the EUT was received in good condition with no apparent damage. As declared by the Applicant, it is identical to the production units.

Test start date: February 12, 2021

Test completion date: February 22, 2021

The test results in this report pertain only to the item tested.

2.0 General Description

2.1 Product Description

Vocera Communications supplied the following description of the EUT:

The B3000n Communication Badge is an 2.4 GHz, 5GHz 802.11abgn + BT 3.0 pendent that is designed to provide communication to mobile users. Since the EUT would be placed on a tabletop during operation, the EUT was treated as table-top equipment during testing to simulate the end-user environment. The EUT is battery powered and is unable to transmit while charging.

The information about the 5GHz radio, installed in the model B3000n, is presented below.

Radio Information	
Applicant	Vocera Communications
Model Number	B3000n
FCC Identifier	QGZB3000N
IC Identifier	4362A-B3000N
Modulation Technique	OFDM
Max RF Output	14.52 dBm
Frequency Range	U-NII 1: 5180 – 5240 MHz U-NII 2A: 5260 – 5320 MHz U-NII 2C: 5500 – 5700 MHz U-NII 3: 5745 – 5825 MHz
Type of modulation	OFDM
Antenna(s) & Gain	Internal Antenna, Gain: +3.0 dBi
Applicant Name & Address	Vocera Communications 525 Race St, Ste 150 San Jose, CA 95126 USA

2.2 Related Submittal(s) Grants

None.

2.3 Test Methodology

Antenna conducted measurements and Radiated emissions measurements were performed according to the FCC documents "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E" (789033 D02 General U-NII Test Procedures New Rules v02r01), RSS-247 Issue 2, ANSI C63.10: 2013 and RSS-GEN Issue 5.

Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the **"Data Sheet"** of this Application.

All other measurements were made in accordance with the procedures in part 2 of CFR 47.

2.4 Test Facility

The test site used to collect the radiated data is site 1 (10-m semi-anechoic chamber). This test facility and site measurement data have been fully placed on file with the FCC, IC and A2LA accredited.

2.5 Measurement Uncertainty

Compliance with the limits was based on the results of the measurements and doesn't take into account the measurement uncertainty.

Estimated Measurement Uncertainty

Measurement	Expanded Uncertainty (k=2)		
	0.15 MHz – 1 GHz	1 GHz – 6 GHz	> 6 GHz
RF Power and Power Density – antenna conducted	1.1 dB	1.5 dB	–
Unwanted emissions - antenna conducted	1.2 dB	1.7 dB	2.0 dB
Bandwidth – antenna conducted	50 Hz	100 Hz	–
Radiated emissions	4.2 dB	5.4 dB	
AC mains conducted emissions	2.4 dB	-	-

3.0 System Test Configuration

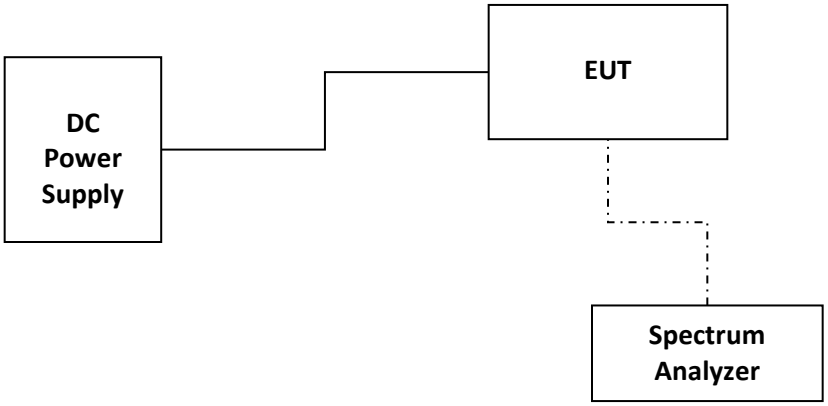
3.1 Support Equipment

Support Equipment		
Description	**Manufacturer**	**Model No./ Part No.**
DC Power Supply	Extech	EP-3003

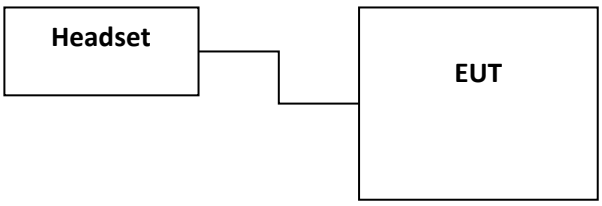
3.2 Block Diagram of Test Setup

Equipment Under Test			
Description	**Manufacturer**	**Model Number**	**Serial Number**
Communication Badge	Vocera	B3000n	K4HM203B0BEA
Headset for B3000n	Plantronics	MX250	Not listed

Antenna was removed and co-axial connector was installed for Conducted Measurements.



Radiated Measurements



3.3 Justification

Preliminary testing was performed for all modulation/data rate modes. The worse-case data rate with highest power and widest spectrum were selected for final measurements:

OFDM, 6MB/s – for 802.11a
OFDM, MCS0 – for 802.11n 20MHz
OFDM, MCS0 – for 802.11n 40MHz

Different orientation of the EUT were tested and only the worse-case emissions were reported.

For radiated emission measurements the EUT is placed on a non-conductive table.

Unless otherwise stated in this report, measurements made for Radiated Spurious and Band Edge were made with the worst-case power measured and widest bandwidth per guidelines in ANSI 63.10 2013. Spurious emissions were performed at channels 36, 40, 48 for 802.11a; 36, 40, 48 for 802.11n 20MHz; 52, 62 for 802.11n 40MHz.

ANSI 63.10 2013; section 5.6.2.2 Determining worst-case mode.
a) Band edge requirements—Measurements on the mode with the widest bandwidth can be used to cover the same channel (center frequency) on modes with narrower bandwidth that have the same or lower output power for each modulation family (e.g., OFDM and direct sequence spread spectrum).

b) Spurious emissions—Measure the mode with the highest output power and the mode with the highest output power spectral density for each modulation family (e.g., OFDM and direct sequence spread spectrum).

3.4 Mode of Operation During Test

During transmitter testing, the transmitter was setup to transmit continuously using the maximum RF power setting provided by the manufacturers via test scripts. The corresponding output power in dBm can be found in section 4.1.3 of this report.

3.5 Modifications required for Compliance

Intertek installed no modifications during compliance testing in order to bring the product into compliance.

3.6 Additions, deviations and exclusions from standards

No additions, deviations or exclusion have been made from standard.

4.0 Measurement Results

4.1 Maximum Conducted Output Power
FCC Rule 15.407(a)(1)(iv)

4.1.1 Requirement

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. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1-megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

4.1.2 Procedure

The Procedure, described in the FCC Publication 789033 D02 General U-NII Test Procedures New Rules v02r01, was used. Specifically, Section E (2) (c) Method SA-1 for Maximum Conducted Output Power

The antenna port of the EUT was connected to the input of a spectrum analyzer to measure the Maximum Conducted Transmitter Output Power.

Tested By	Test Date
Anderson Soungpanya	February 12- 15, 2021

4.1.3 Test Results

Mode	Channel	Frequency MHz	Avg Conducted Power dBm	EUT Power Setting
802.11a	36	5180	13.99	16
	40	5200	14.04	16
	48	5240	14.39	16
	36	5260	13.29	16
	60	5300	14.10	16
	64	5320	14.06	16
	100	5500	13.98	16
	116	5580	13.99	16
	140	5700	13.43	16
	149	5745	12.47	16
	157	5785	12.34	16
	165	5825	11.84	16
802.11n 20MHz	36	5180	13.83	16
	40	5200	14.02	16
	48	5240	14.19	16
	36	5260	12.81	16
	60	5300	13.47	16
	64	5320	13.81	16
	100	5500	13.40	16
	116	5580	13.57	16
	140	5700	13.33	16
	149	5745	12.68	16
	157	5785	12.59	16
	165	5825	12.72	16
802.11n 40MHz	38	5190	14.02	16
	46	5230	14.19	16
	52	5270	13.42	16
	62	5310	14.52	16
	102	5510	13.99	16
	110	5550	14.32	16
	134	5670	14.02	16
	151	5755	12.19	16
	159	5795	12.81	16

4.3 Transmitter Radiated Emissions
FCC Rule 15.407(b) (1-8) 15.209, 15.205

4.3.1 Requirement

(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.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

(7) The provisions of §15.205 apply to intentional radiators operating under this section.

(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

Emissions which fall in the restricted bands, as defined in §15.205(a), must comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

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.

Note: An out-of-band emission that complies with both the average and peak limits of Section 15.209 is not required to satisfy the -27 dBm/MHz peak emission limit.

4.3.2 Procedure

Radiated emission measurements were performed from 9 kHz to 40 GHz according to the procedure described in ANSI C63.10: 2013. Spectrum Analyzer Resolution Bandwidth is 200Hz or greater for frequencies 9kHz to 30MHz, 100 kHz or greater for frequencies 30 MHz to 1000 MHz, 1 MHz for frequencies above 1000 MHz. Above 1000 MHz Peak and Average measurements were performed.

The EUT is placed on a plastic turntable that is 80 cm in height for below 1000MHz and 1.5m in height for above 1GHz. If the EUT attaches to peripherals, they are connected and operational (as typical as possible). During testing, all cables were manipulated to produce worst-case emissions. The signal is maximized through rotation. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters.

Radiated emissions are taken at 3 meters for frequencies above 1 GHz and at 10 meters for frequencies below 1 GHz.

Measurements made from 30 MHz to 40 GHz were measured with 50 ohm terminator on the output of the EUT RF port. A preamp was used from 30MHz to 40GHz.

All measurements were made with a Peak Detector and compared to QP limits for 30MHz – 1GHz and Average & Peak limits for 1GHz – 40 GHz.

EUT was measured on all 3 Axis, X, Y and Z. Data is presented with the worst-case configuration (the configuration which resulted in the highest emission levels).

4.3.3 Field Strength Calculation

<u>Field Strength Calculation</u>

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF – AG; if measurement is performed at a distance other than specified in the rule, a Distance Correction Factor (DCF) shall be added.

Where FS = Field Strength in dB(μV/m)
RA = Receiver Amplitude (including preamplifier) in dB(μV); AF = Antenna Factor in dB(1/m)
CF = Cable Attenuation Factor in dB; AG = Amplifier Gain in dB

Assume a receiver reading of 52.0 dB(μV) is obtained. The antennas factor of 7.4 dB(1/m) and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving field strength of 32 dB(μV/m). This value in dB(μV/m) was converted to its corresponding level in μV/m.
RA = 52.0 dB(μV)
AF = 7.4 dB(1/m)
CF = 1.6 dB
AG = 29.0 dB
FS = 52.0+7.4+1.6-29.0 = 32 dB(μV/m).
Level in μV/m = Common Antilogarithm [(32 dBμV/m)/20] = 39.8 μV/m.

4.3.4 Antenna-port conducted measurements

Antenna-port conducted measurements may also be used as an alternative to radiated measurements for demonstrating compliance in the restricted frequency bands. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test for cabinet/case spurious emissions is required.

4.3.5 General Procedure for conducted measurements in restricted bands

a) Measure the conducted output power (in dBm) using the detector specified for determining quasi-peak, peak, and average conducted output power, respectively.

b) Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP level (see 12.2.5 for guidance on determining the applicable antenna gain)

c) Add the appropriate maximum ground reflection factor to the EIRP level (6 dB for frequencies ≤ 30 MHz, 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive and 0 dB for frequencies > 1000 MHz).

d) For devices with multiple antenna-ports, measure the power of each individual chain and sum the EIRP of all chains in linear terms (*e.g.*, Watts, mW).

e) Convert the resultant EIRP level to an equivalent electric field strength using the following relationship:
$E = EIRP - 20\log D + 104.8$
where:
E = electric field strength in dBµV/m,
EIRP = equivalent isotropic radiated power in dBm
D = specified measurement distance in meters.
f) Compare the resultant electric field strength level to the applicable limit.
g) Perform radiated spurious emission test

4.3.6 Test Results

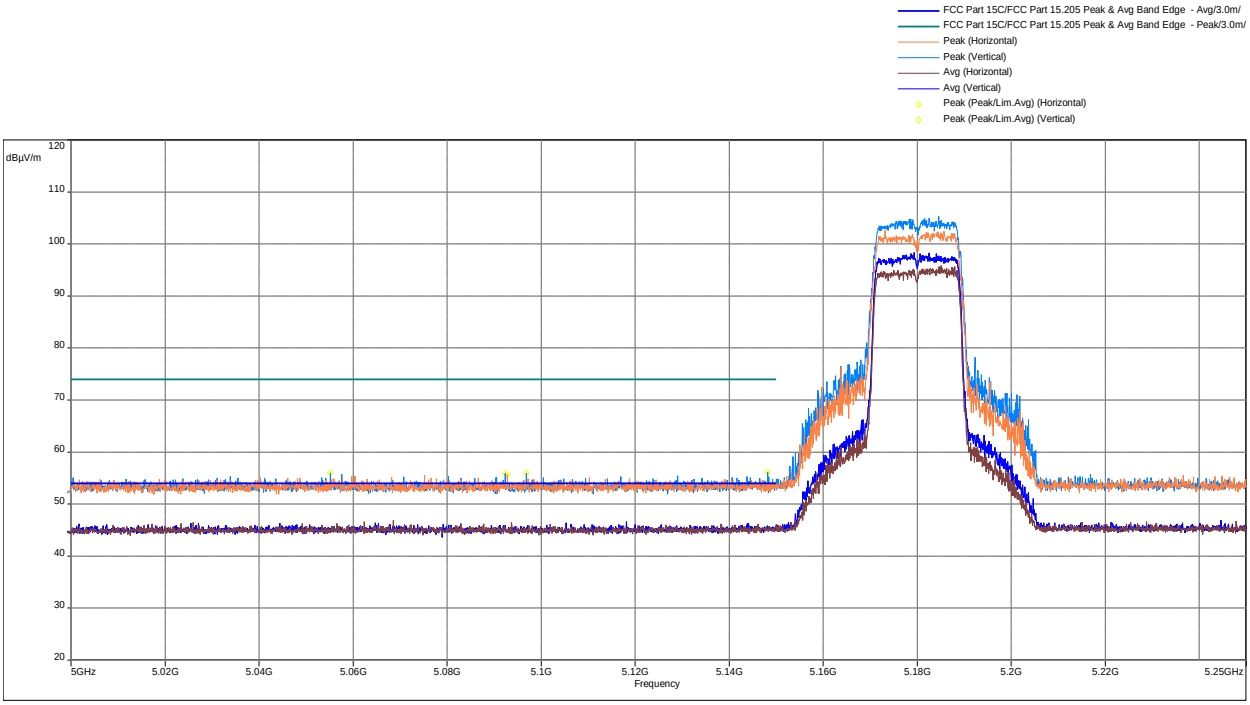
The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Radiated emission measurements were performed up to 40GHz.

Tested By	Test Date
Anderson Soungpanya	February 18 – 22, 2021

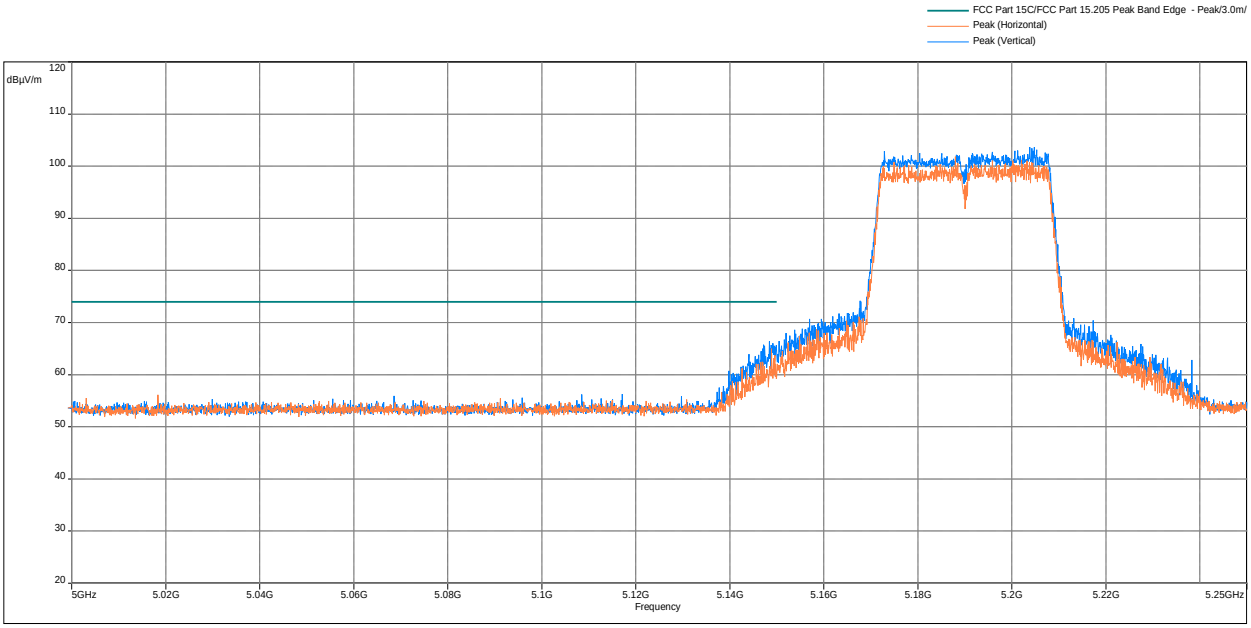
Test Results: 15.209/15.205 Restricted Band Emissions at Antenna Port

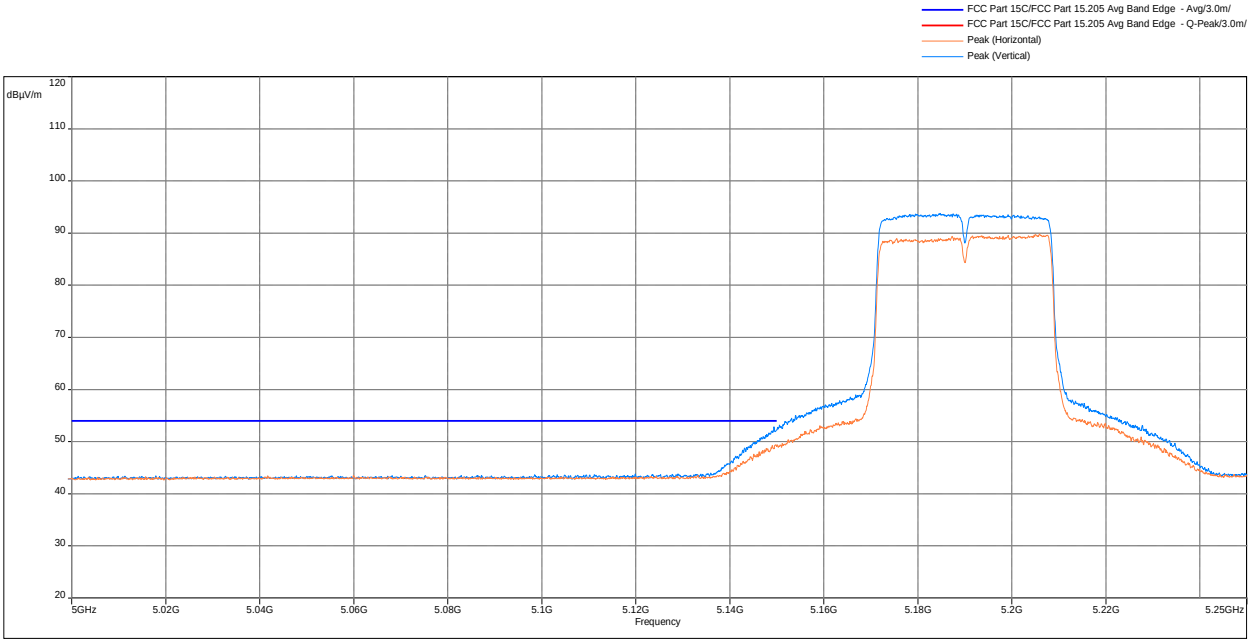
Out-of-Band Spurious Emissions at the Band Edge - 802.11n 20MHz, 5180 MHz



Frequency (MHz)	Detector	Amplitude dB(µV/m)	Limit dB(µV/m)	Margin (dB)
5150	Average	44.95	54	-9.05

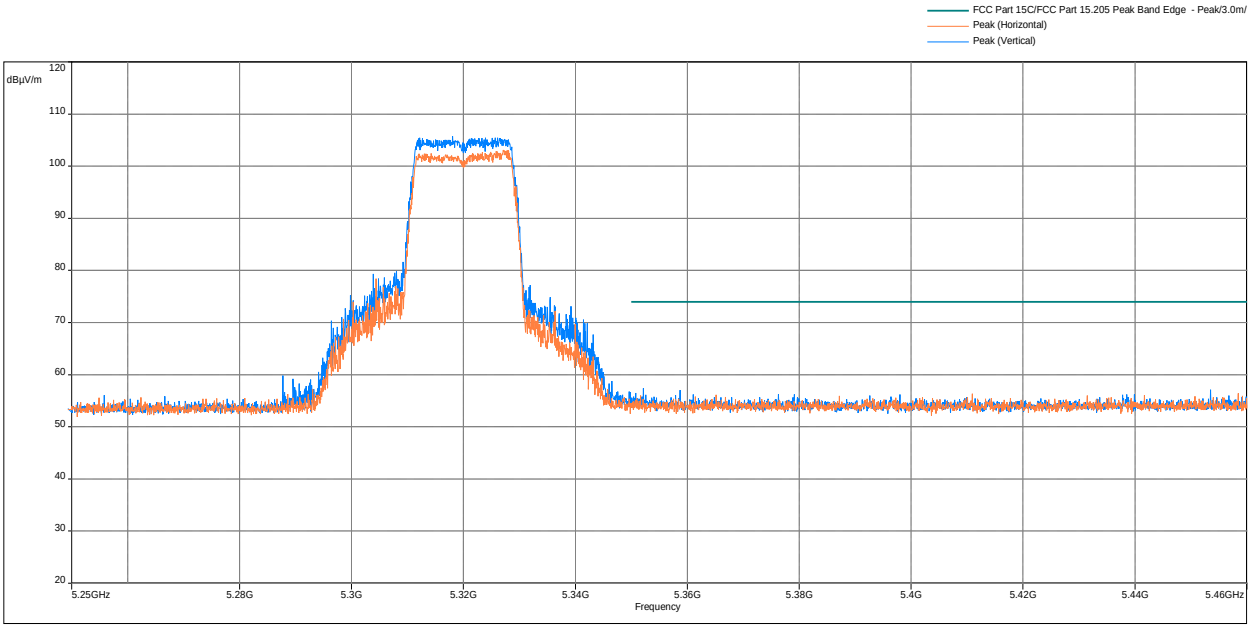
Out-of-Band Spurious Emissions at the Band Edge - 802.11n 40MHz, 5190 MHz

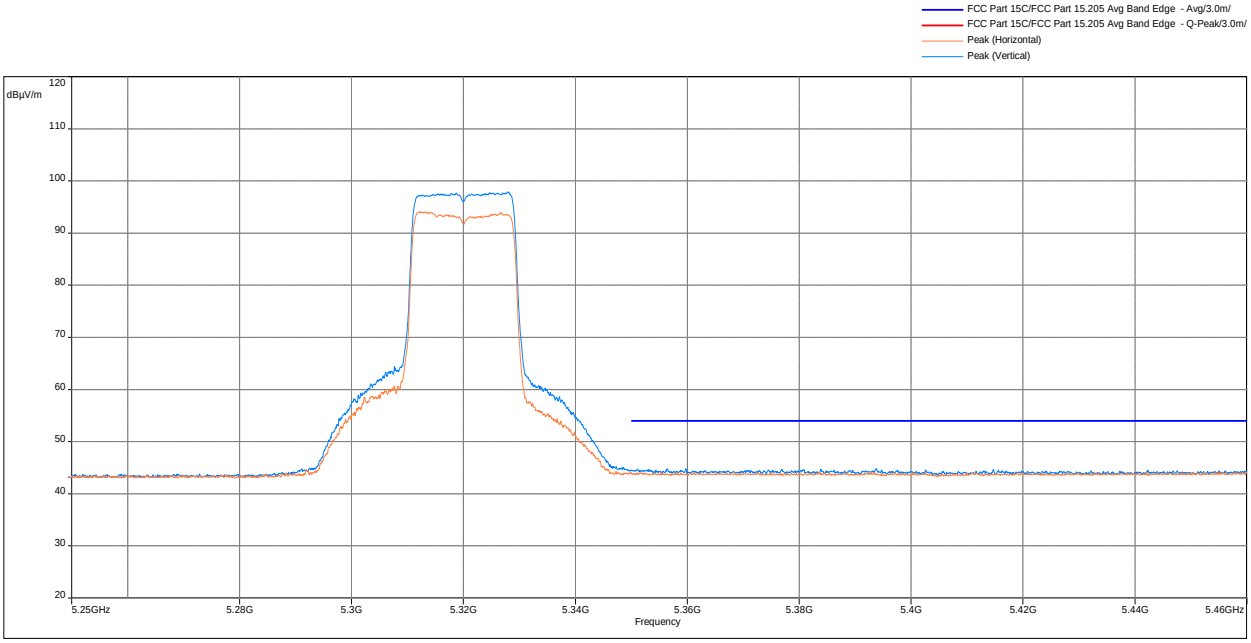




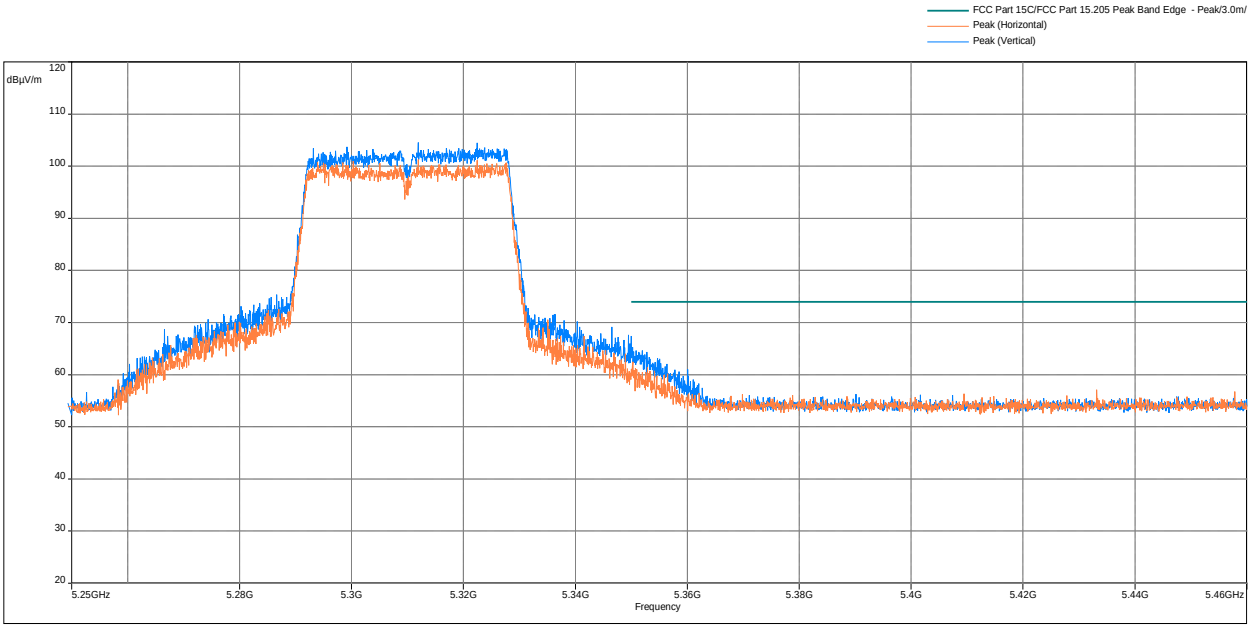
Frequency (MHz)	Detector	Amplitude dB(µV/m)	Limit dB(µV/m)	Margin (dB)
5150	Average	52.18	54	-1.82

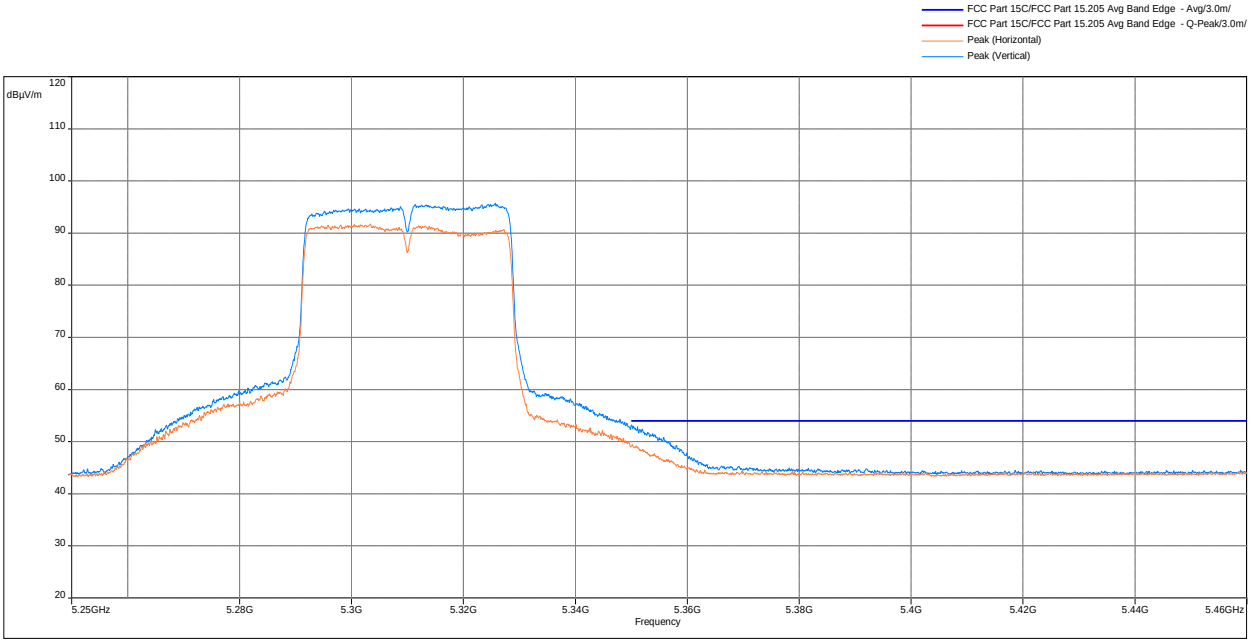
Out-of-Band Spurious Emissions at the Band Edge - 802.1n 20MHz, 5320 MHz





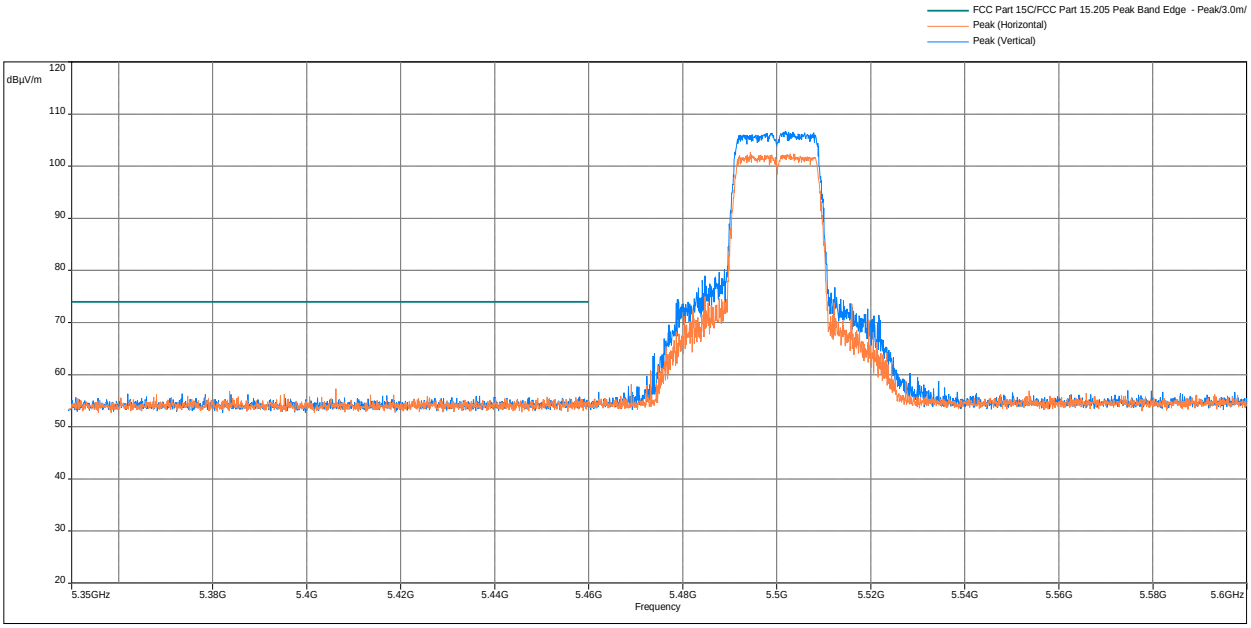
Out-of-Band Spurious Emissions at the Band Edge - 802.11n 40MHz, 5310 MHz

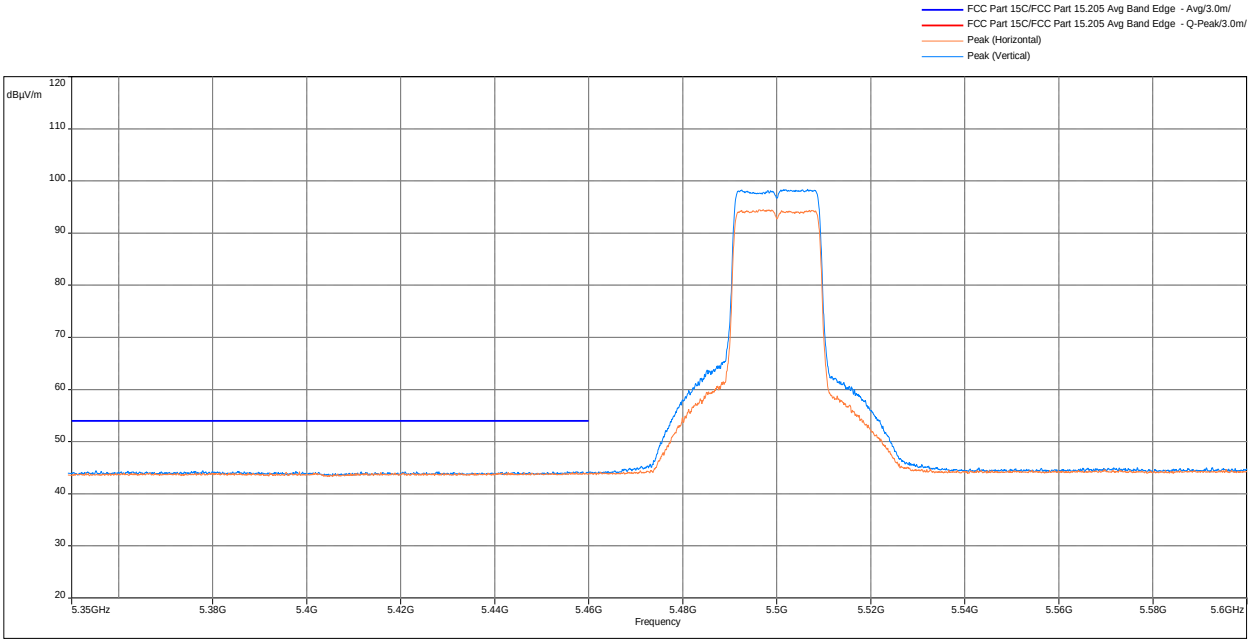




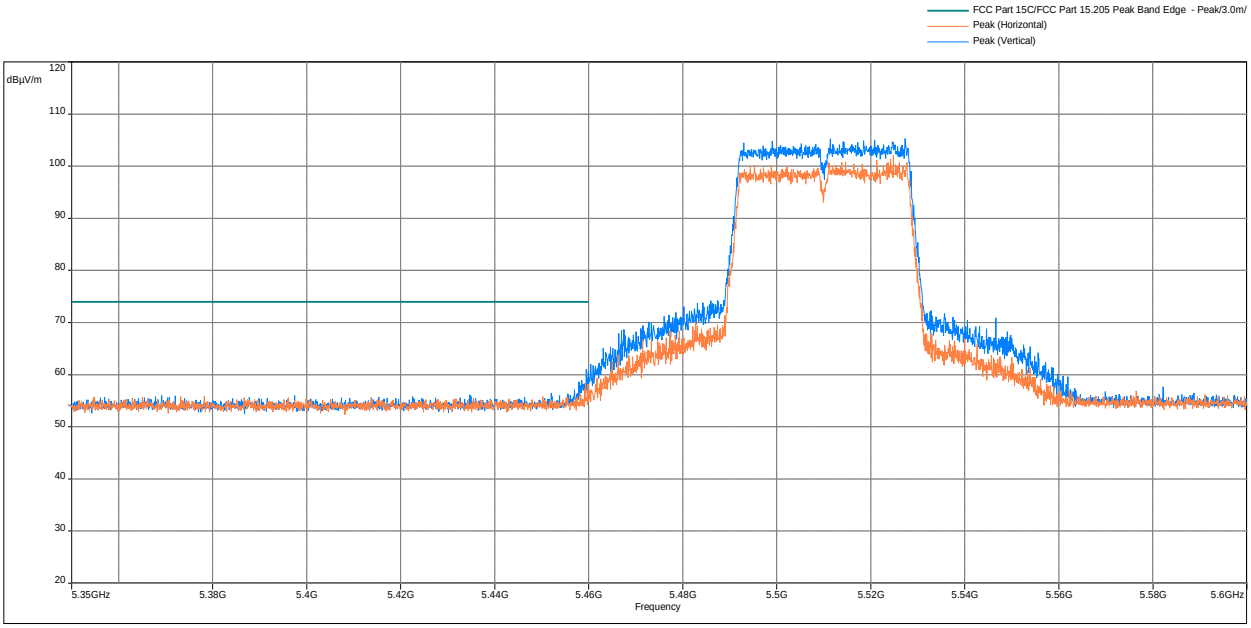
Frequency (MHz)	Detector	Amplitude dB(µV/m)	Limit dB(µV/m)	Margin (dB)
5350	Average	53.20	54	-0.80

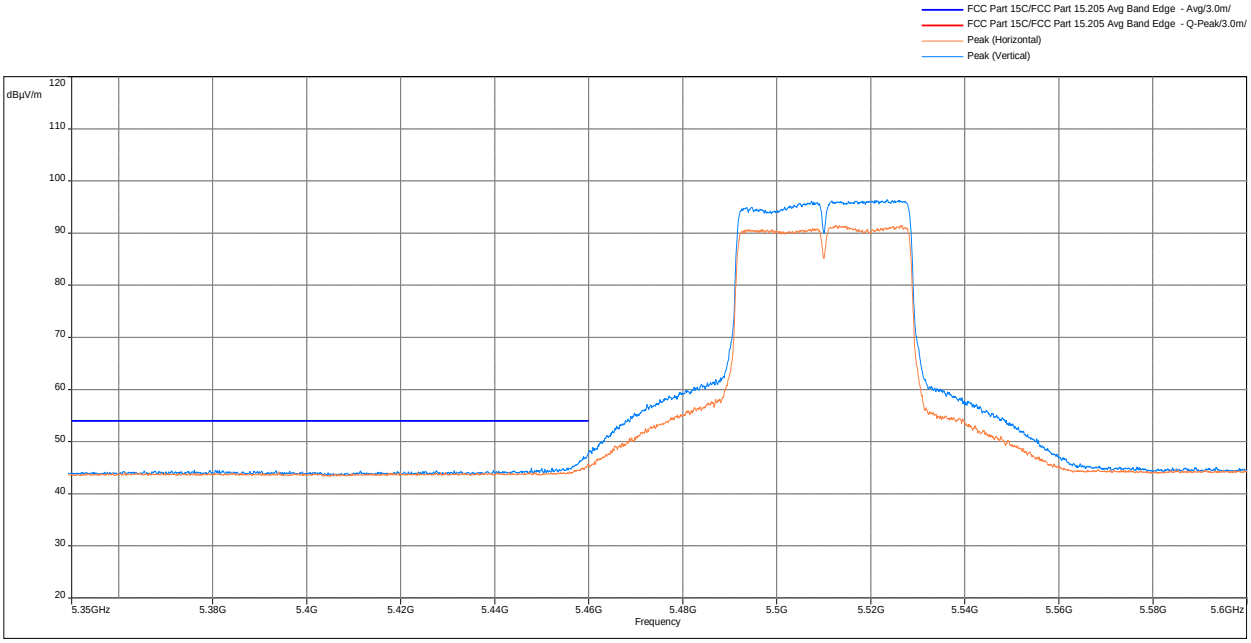
Out-of-Band Spurious Emissions at the Band Edge - 802.1n 20MHz, 5500 MHz





Out-of-Band Spurious Emissions at the Band Edge - 802.11n 40MHz, 5510 MHz

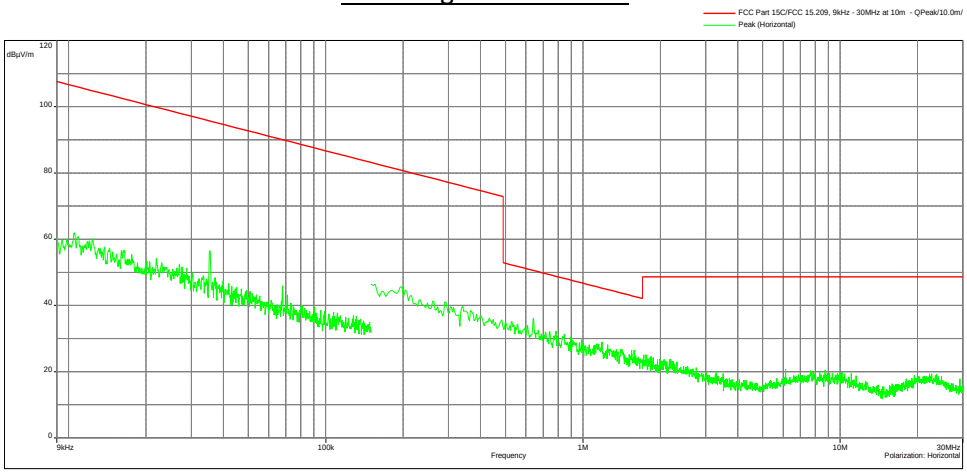




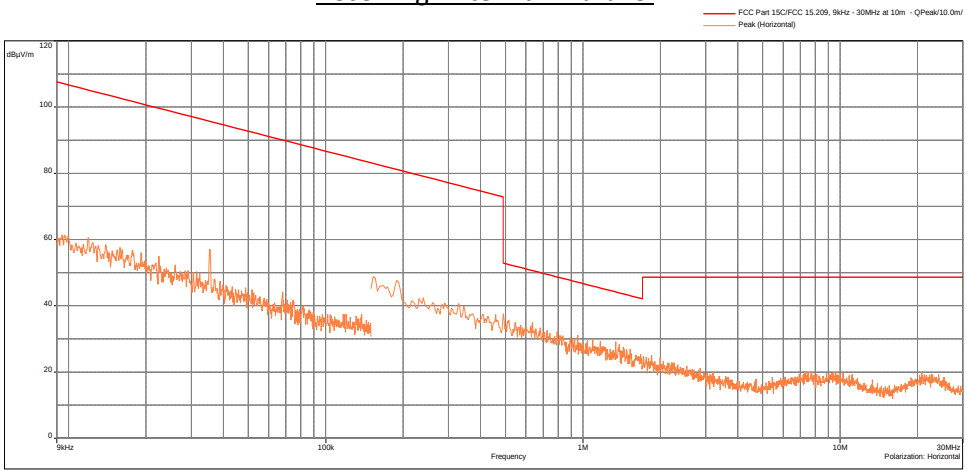
Test Results: 15.209 Radiated Spurious Emissions, Tx at 802.11a 5180MHz

Radiated Spurious Emissions 9 kHz to 30 MHz, Peak Scan

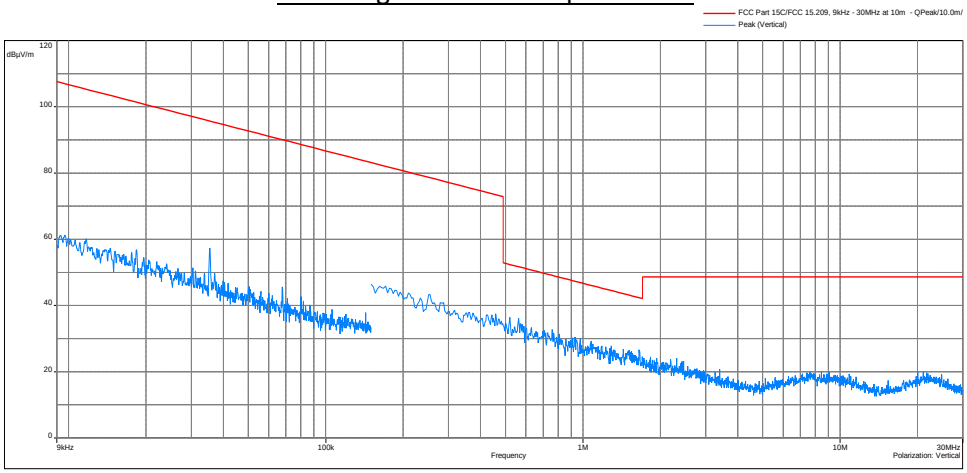
Receiving Antenna - Flat



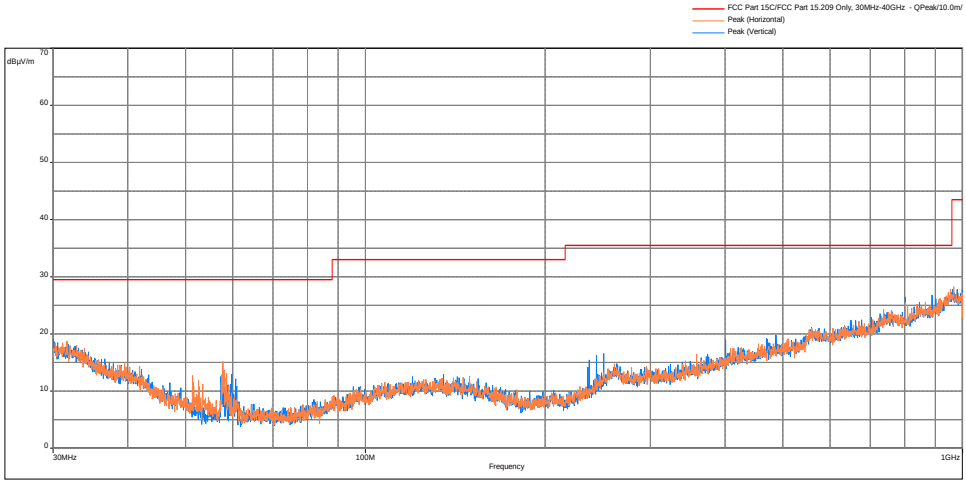
Receiving Antenna – Parallel



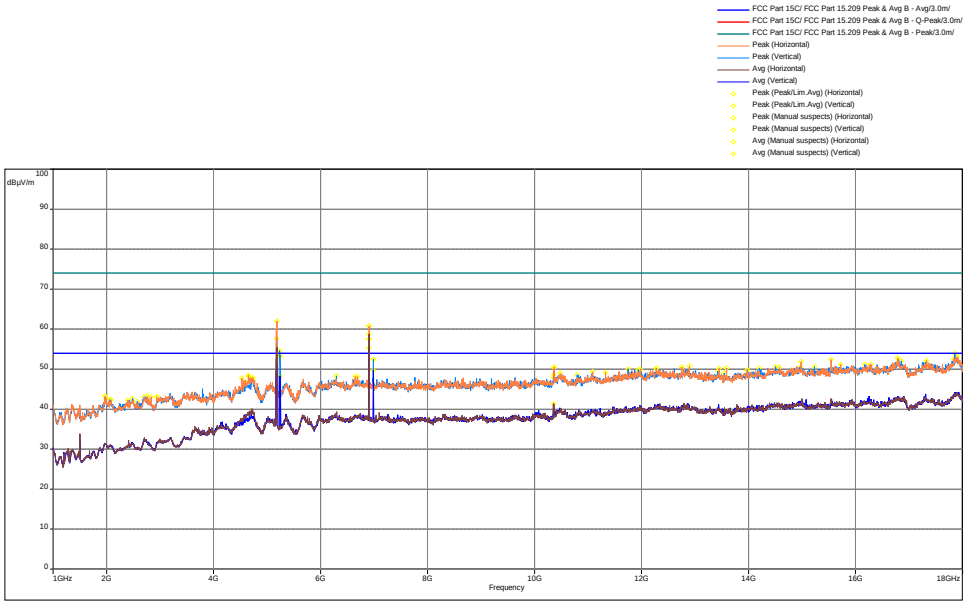
Receiving Antenna – Perpendicular



Radiated Spurious Emissions 30 MHz to 1000 MHz, Peak Scan



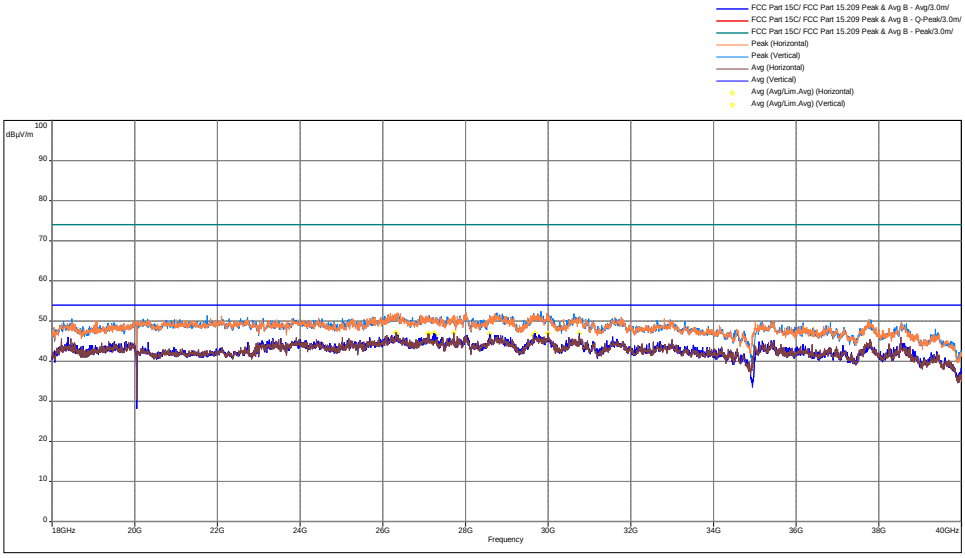
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan & Avg Scan vs Peak & Avg Limit



Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Avg (dBµV/m)	Lim.Avg (dBµV/m)	Margin (dB)	Height (m)	Angle (°)	Polarization	Correction (dB)
6906.367*	57.51	68.3	-	-	-10.79	2.49	71	Vertical	-2.47
6906.367*	60.81	68.3	-	-	-7.49	2.49	148	Horizontal	-2.47
6986.833*	52.47	74	49.7	54	-4.3	1.51	0	Vertical	-2.51
10355.670	47.85	74	41.39	54	-12.61	2.49	255	Horizontal	-0.55

*For emissions outside the 15.205 restricted band, the limit is -27dBm/MHz EIRP (68.3 dBµV/m Peak). As an alternative, compliance can also be demonstrated by meeting the Average (54dBµV/m) and Peak (74dBµV/m) limits of 15.209.

Radiated Spurious Emissions 18000 - 40000 MHz, Peak Scan & Avg Scan vs Peak & Avg Limit

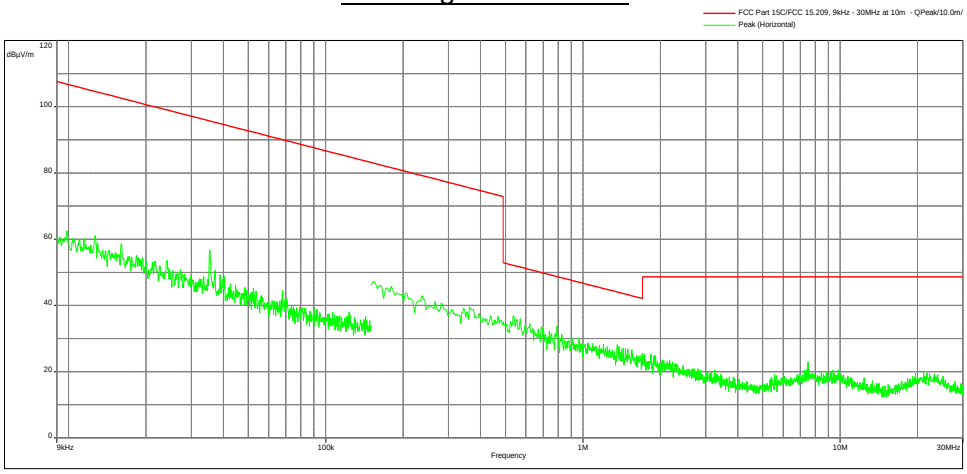


Results	Complies

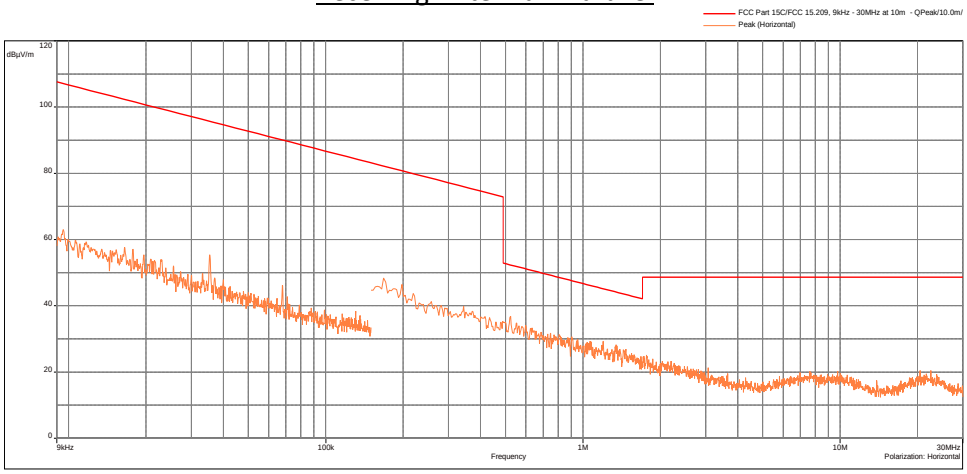
Test Results: 15.209 Radiated Spurious Emissions, Tx at 802.11a 5200MHz

Radiated Spurious Emissions 9 kHz to 30 MHz, Peak Scan

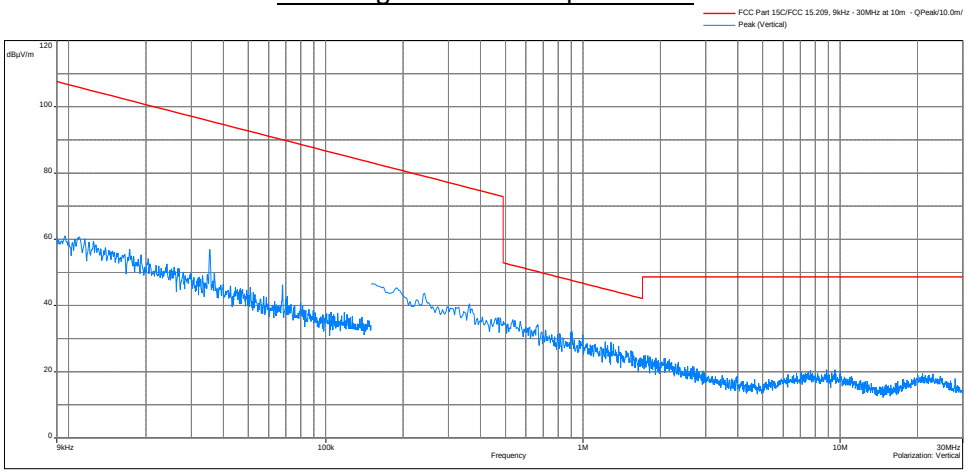
Receiving Antenna - Flat



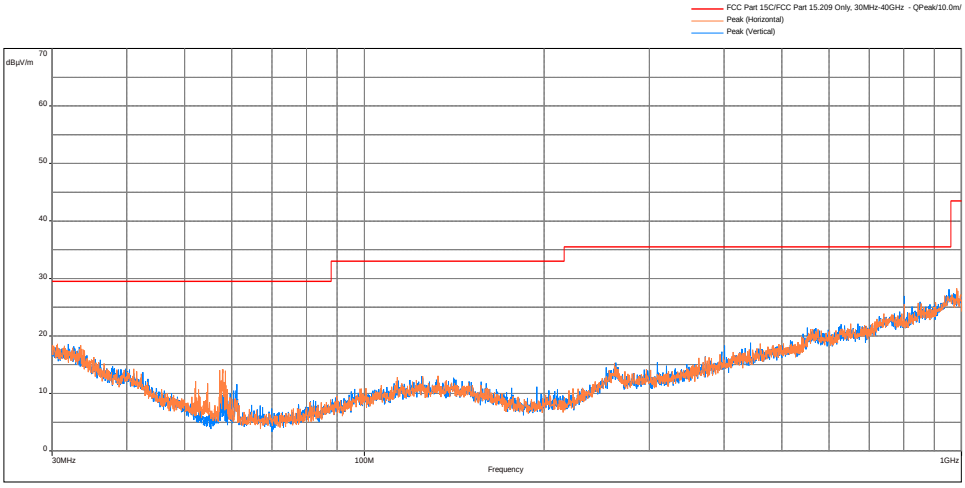
Receiving Antenna – Parallel



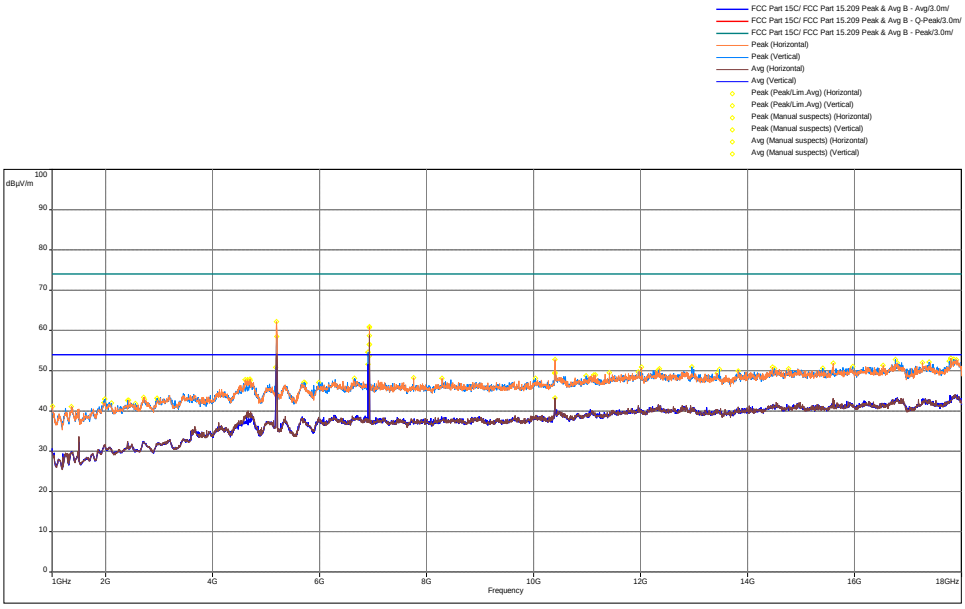
Receiving Antenna – Perpendicular



Radiated Spurious Emissions 30 MHz to 1000 MHz, Peak Scan



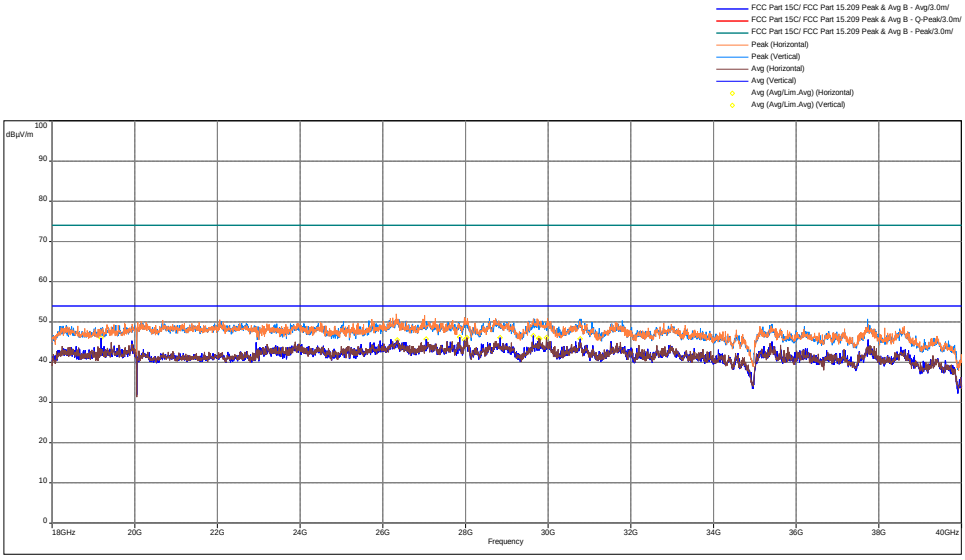
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan & Avg Scan vs Peak & Avg Limit



Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Avg (dBµV/m)	Lim.Avg (dBµV/m)	Margin (dB)	Height (m)	Angle (°)	Polarization	Correction (dB)
6906.367*	54.58	74	51.57	54	-2.43	1.51	0	Vertical	-2.47
6933.000*	56.51	74	53.72	54	-0.28	2.49	70	Vertical	-2.46
6933.000*	60.74	68.3	-	-	-7.56	2.49	352	Horizontal	-2.46
10403.270	53.07	74	43.26	54	-10.74	2.49	255	Horizontal	-0.53

*For emissions outside the 15.205 restricted band, the limit is -27dBm/MHz EIRP (68.3 dBµV/m Peak). As an alternative, compliance can also be demonstrated by meeting the Average (54dBµV/m) and Peak (74dBµV/m) limits of 15.209.

Radiated Spurious Emissions 18000 - 40000 MHz, Peak Scan & Avg Scan vs Peak & Avg Limit

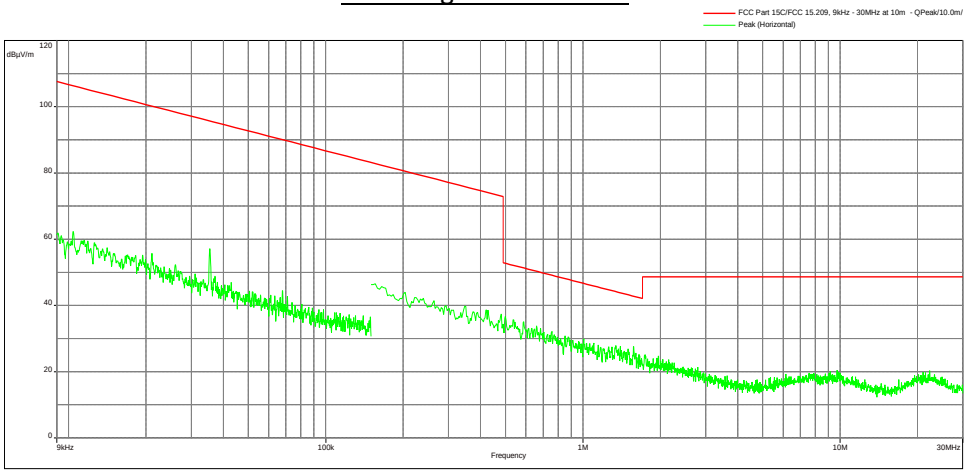


Results	Complies

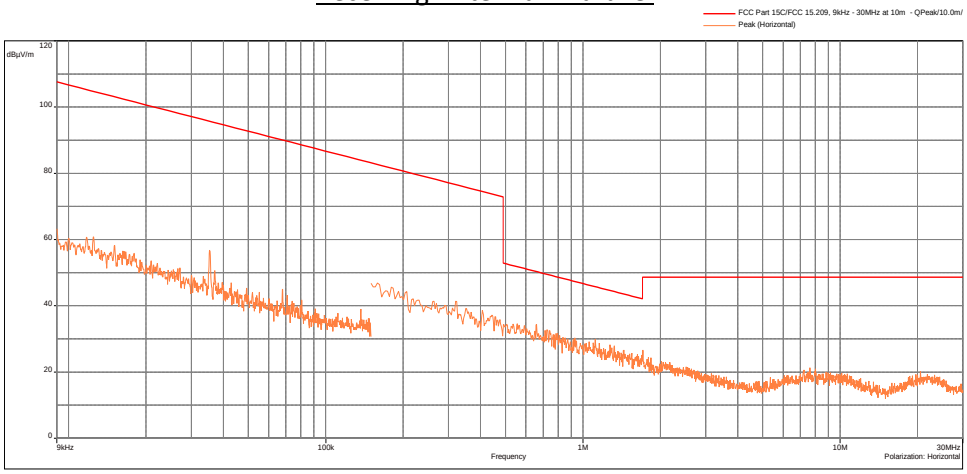
Test Results: 15.209 Radiated Spurious Emissions, Tx at 802.11a 5240MHz

Radiated Spurious Emissions 9 kHz to 30 MHz, Peak Scan

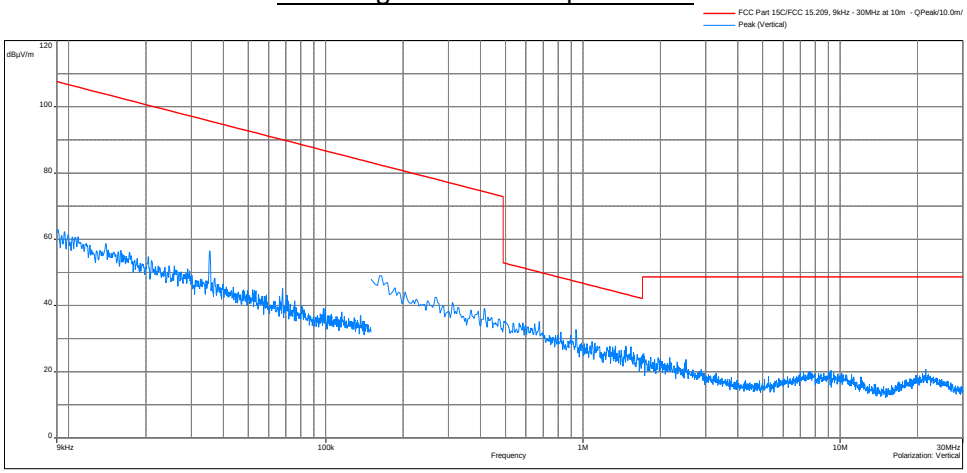
Receiving Antenna - Flat



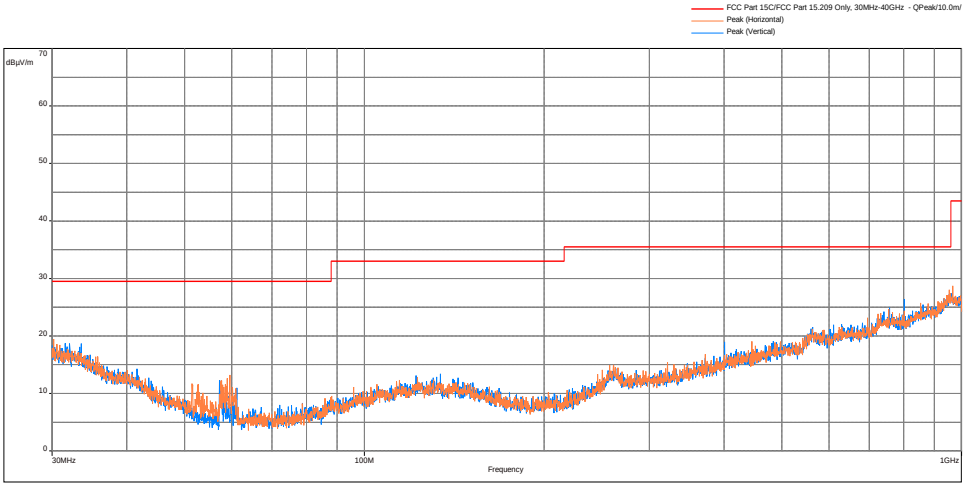
Receiving Antenna – Parallel



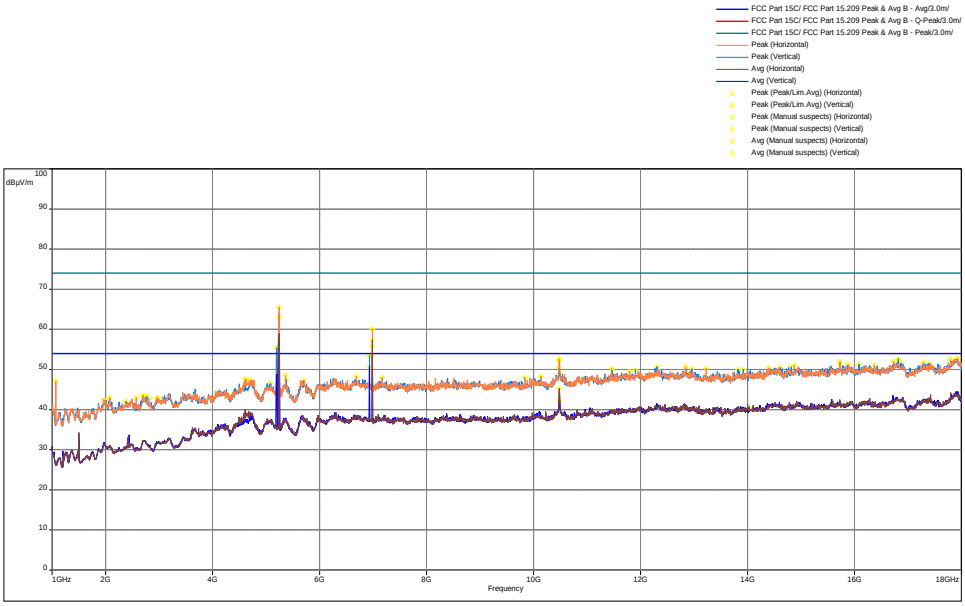
Receiving Antenna – Perpendicular



Radiated Spurious Emissions 30 MHz to 1000 MHz, Peak Scan



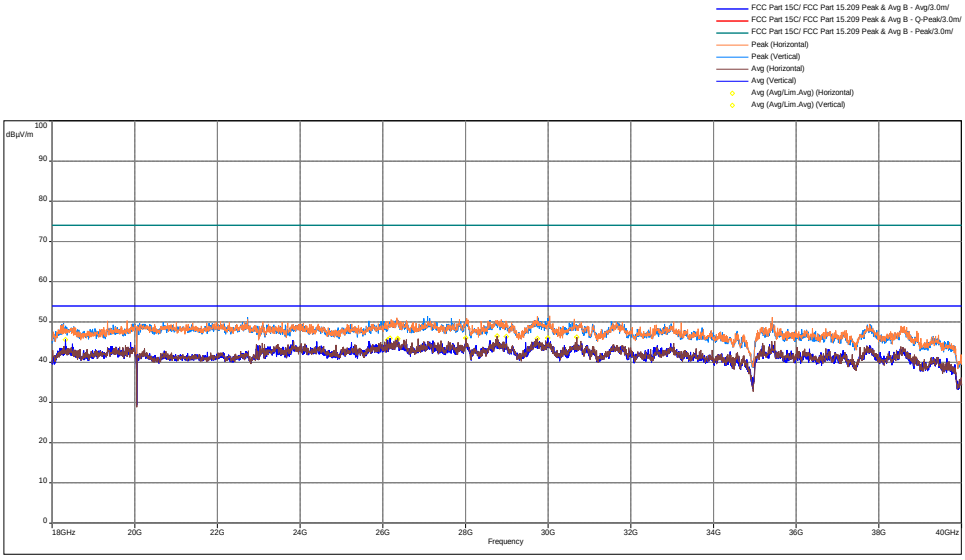
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan & Avg Scan vs Peak & Avg Limit



Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Avg (dBµV/m)	Lim.Avg (dBµV/m)	Margin (dB)	Height (m)	Angle (°)	Polarization	Correction (dB)
6933.000*	53.45	74	50.72	54	-3.28	1.51	0	Vertical	-2.46
6986.833*	55.84	74	53.57	54	-0.43	2.49	61	Vertical	-2.51
6986.833*	59.94	68.3	-	-	-8.36	2.49	2	Horizontal	-2.51
10479.200	52.60	74	45.3	54	-8.7	2.49	263	Horizontal	-0.49
10484.300	48.94	74	42.26	54	-11.74	2.49	106	Vertical	-0.49

*For emissions outside the 15.205 restricted band, the limit is -27dBm/MHz EIRP (68.3 dBµV/m Peak). As an alternative, compliance can also be demonstrated by meeting the Average (54dBµV/m) and Peak (74dBµV/m) limits of 15.209.

Radiated Spurious Emissions 18000 - 40000 MHz, Peak Scan & Avg Scan vs Peak & Avg Limit

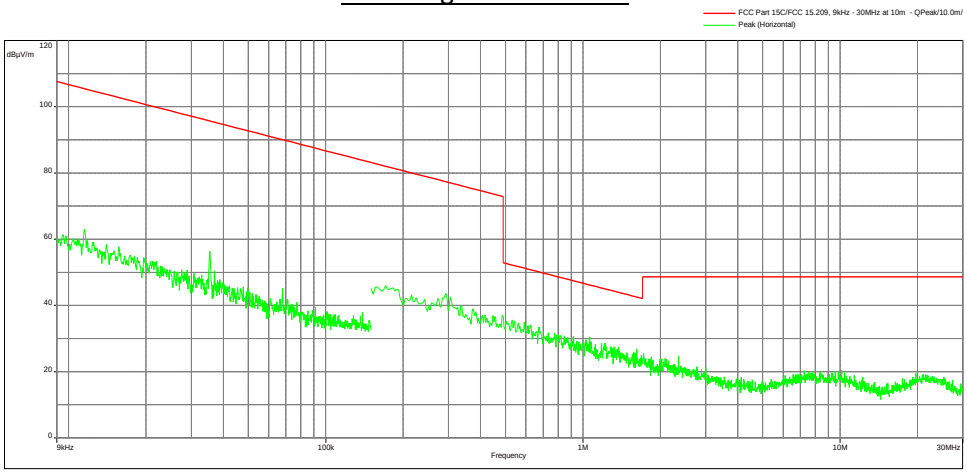


Results	Complies

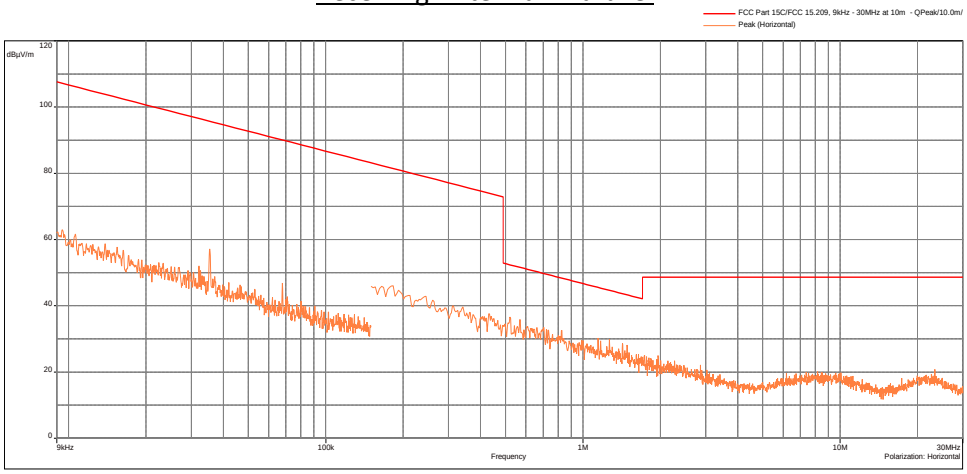
Test Results: 15.209 Radiated Spurious Emissions, Tx at 802.11n 5180MHz

Radiated Spurious Emissions 9 kHz to 30 MHz, Peak Scan

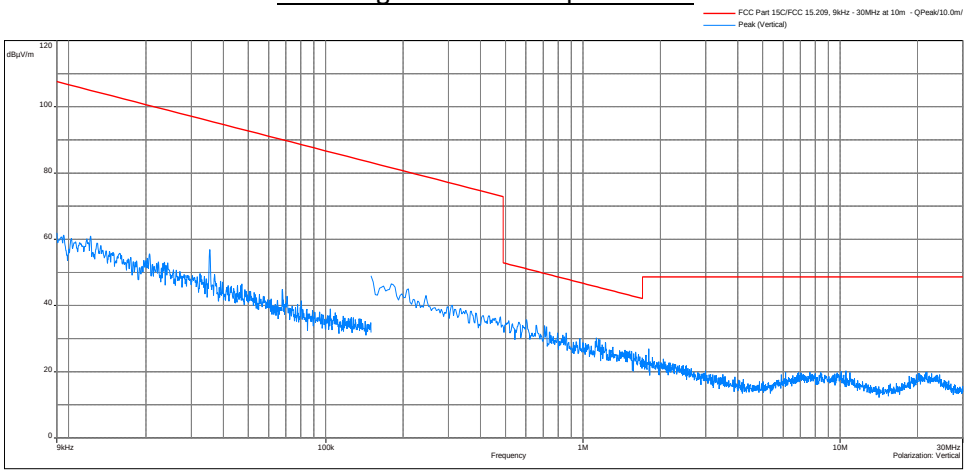
Receiving Antenna - Flat



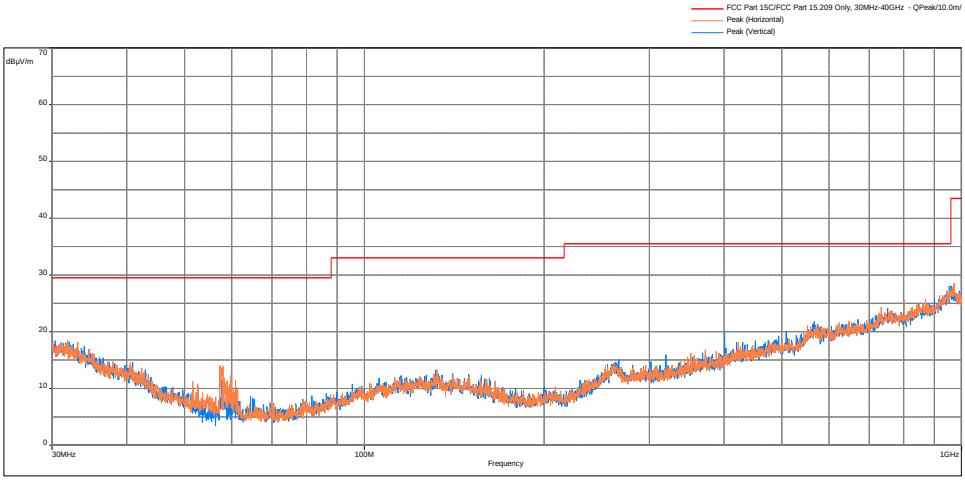
Receiving Antenna – Parallel



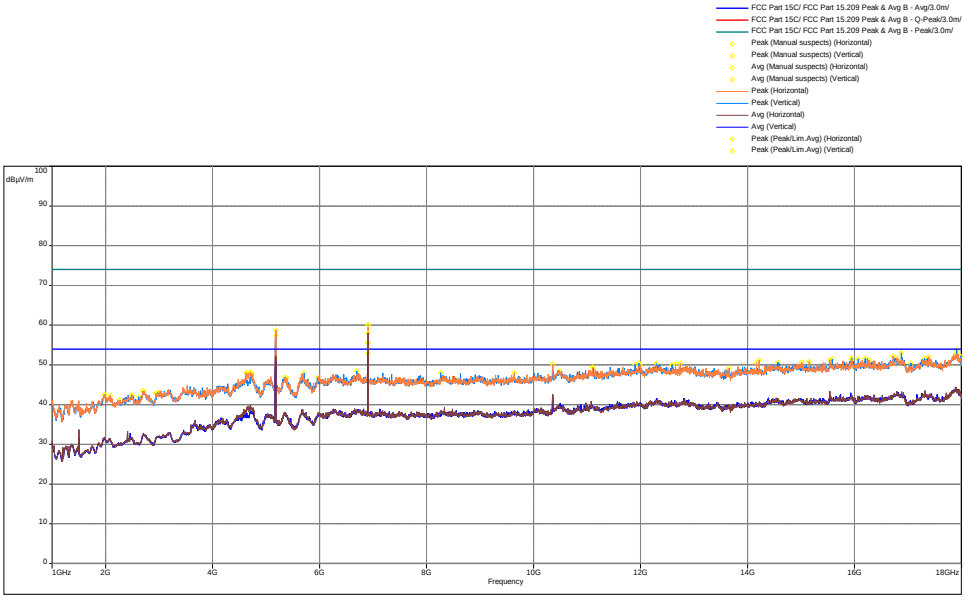
Receiving Antenna – Perpendicular



Radiated Spurious Emissions 30 MHz to 1000 MHz, Peak Scan



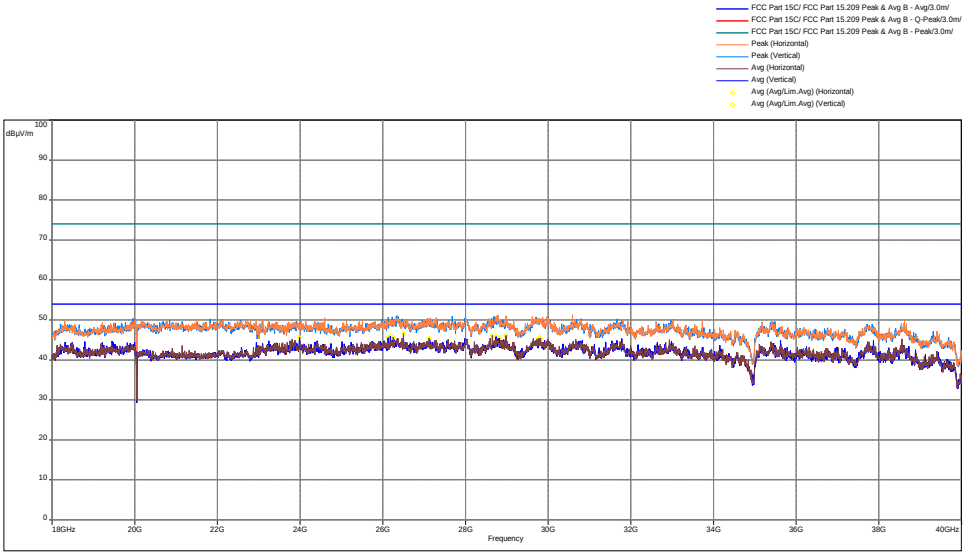
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan & Avg Scan vs Peak & Avg Limit



Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Avg (dBµV/m)	Lim.Avg (dBµV/m)	Margin (dB)	Height (m)	Angle (°)	Polarization	Correction (dB)
6906.367*	55.50	74	52.95	54	-1.05	1.51	124	Vertical	-2.47
6906.367*	60.09	68.3	-	-	-8.21	2.49	178	Horizontal	-2.47

*For emissions outside the 15.205 restricted band, the limit is -27dBm/MHz EIRP (68.3 dBµV/m Peak). As an alternative, compliance can also be demonstrated by meeting the Average (54dBµV/m) and Peak (74dBµV/m) limits of 15.209.

Radiated Spurious Emissions 18000 - 40000 MHz, Peak Scan & Avg Scan vs Peak & Avg Limit

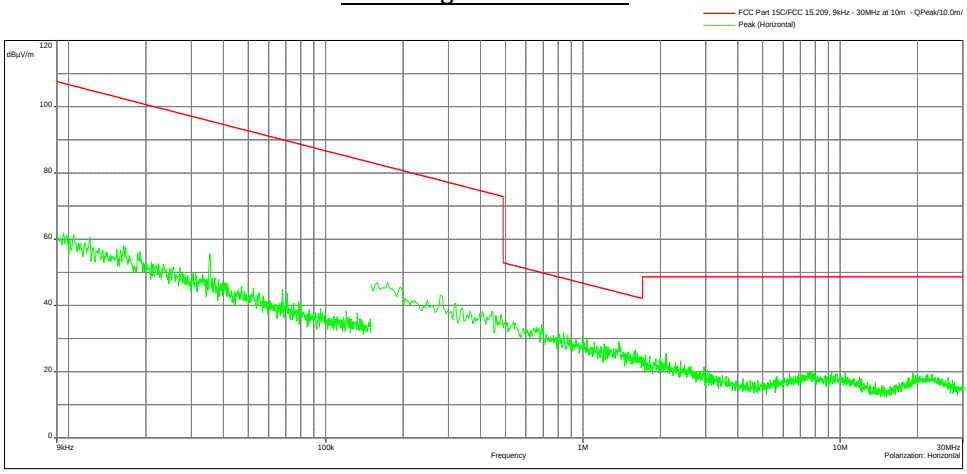


Results	Complies

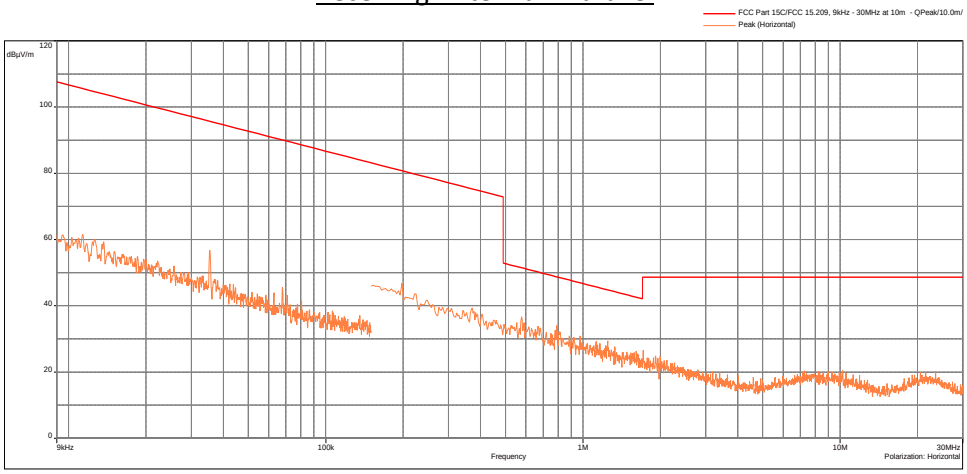
Test Results: 15.209 Radiated Spurious Emissions, Tx at 802.11n 5200MHz

Radiated Spurious Emissions 9 kHz to 30 MHz, Peak Scan

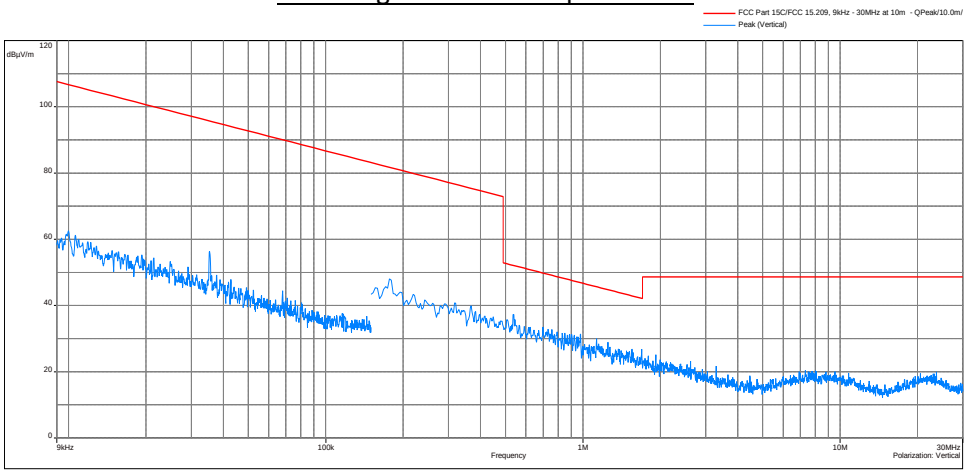
Receiving Antenna - Flat



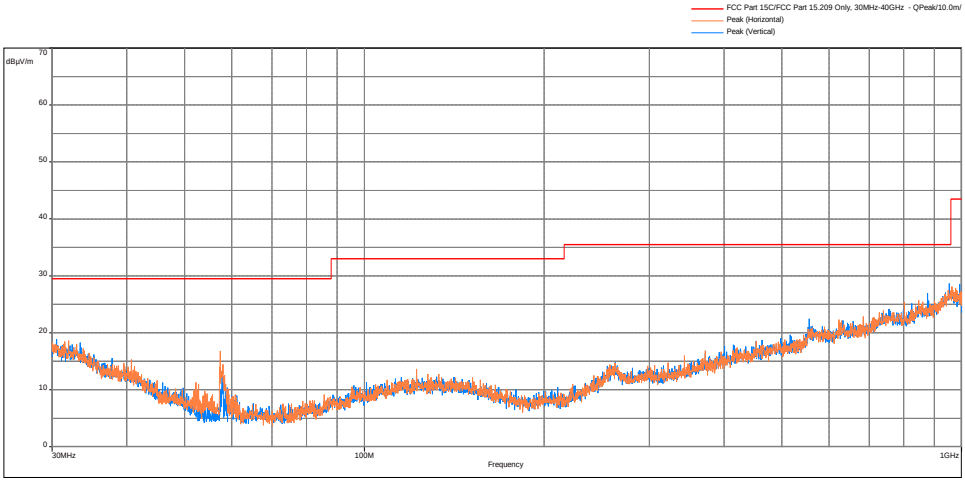
Receiving Antenna – Parallel



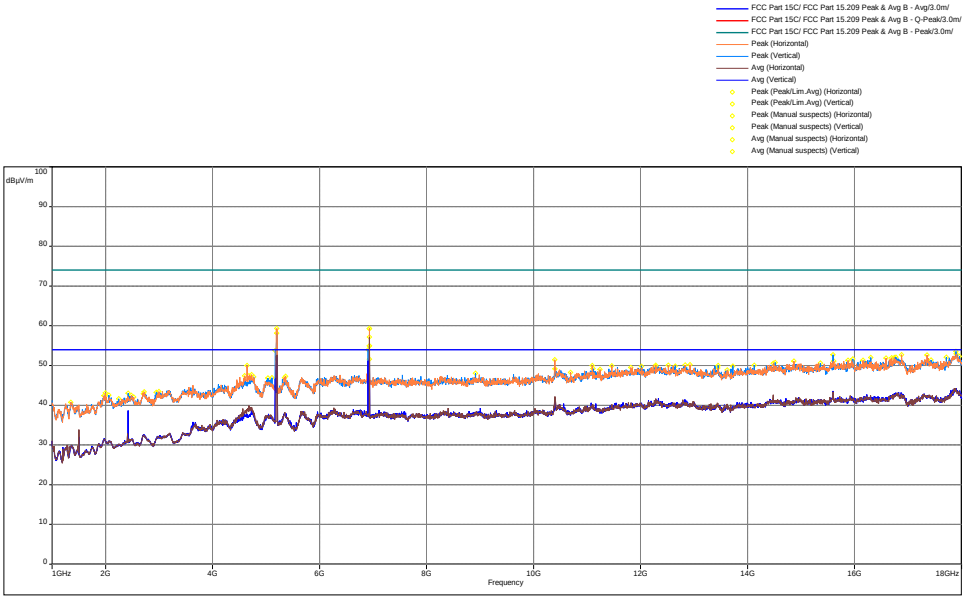
Receiving Antenna – Perpendicular



Radiated Spurious Emissions 30 MHz to 1000 MHz, Peak Scan



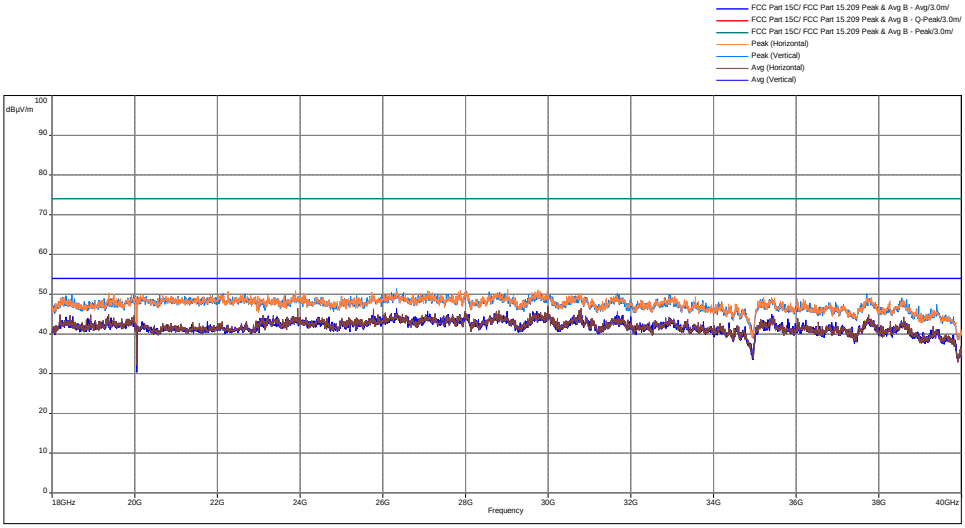
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan & Avg Scan vs Peak & Avg Limit



Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Avg (dBµV/m)	Lim.Avg (dBµV/m)	Margin (dB)	Height (m)	Angle (°)	Polarization	Correction (dB)
6933.000*	54.94	74	51.62	54	-2.38	2.49	70	Vertical	-2.46
6933.000*	59.24	68.3	-	-	-9.06	2.49	155	Horizontal	-2.46

*For emissions outside the 15.205 restricted band, the limit is -27dBm/MHz EIRP (68.3 dBµV/m Peak). As an alternative, compliance can also be demonstrated by meeting the Average (54dBµV/m) and Peak (74dBµV/m) limits of 15.209.

Radiated Spurious Emissions 18000 - 40000 MHz, Peak Scan & Avg Scan vs Peak & Avg Limit

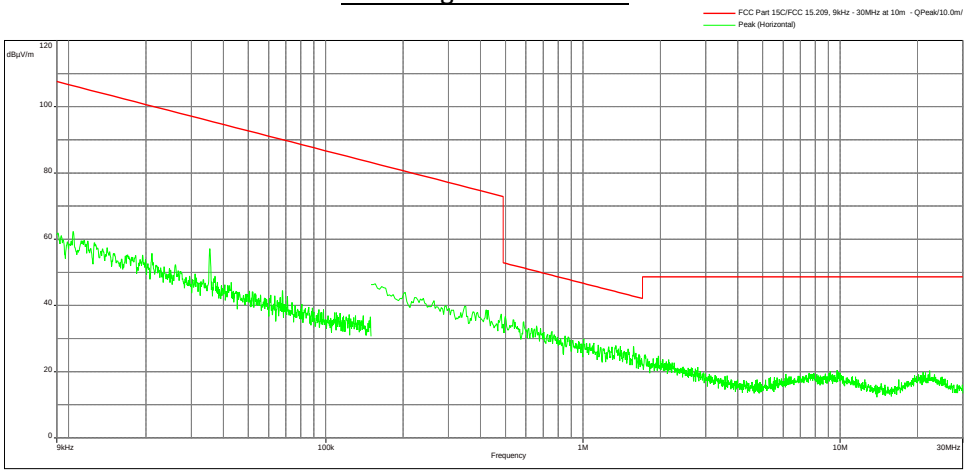


Results	Complies

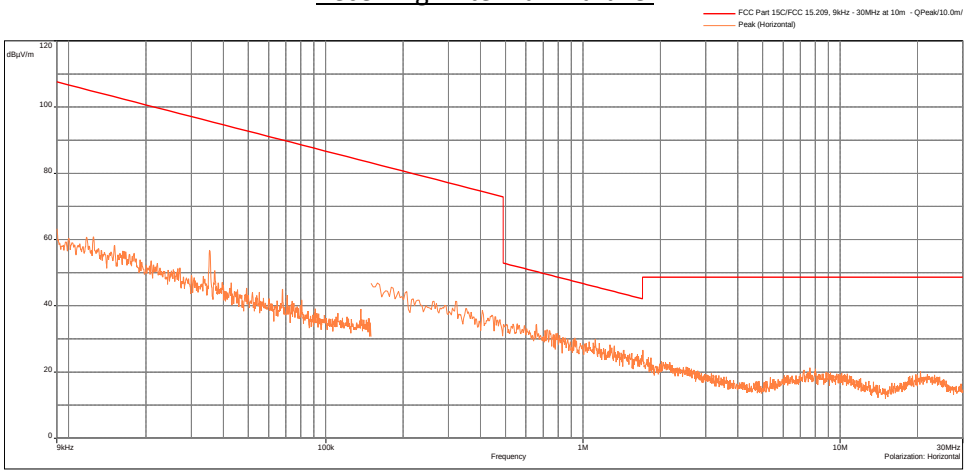
Test Results: 15.209 Radiated Spurious Emissions, Tx at 802.11n 5240MHz

Radiated Spurious Emissions 9 kHz to 30 MHz, Peak Scan

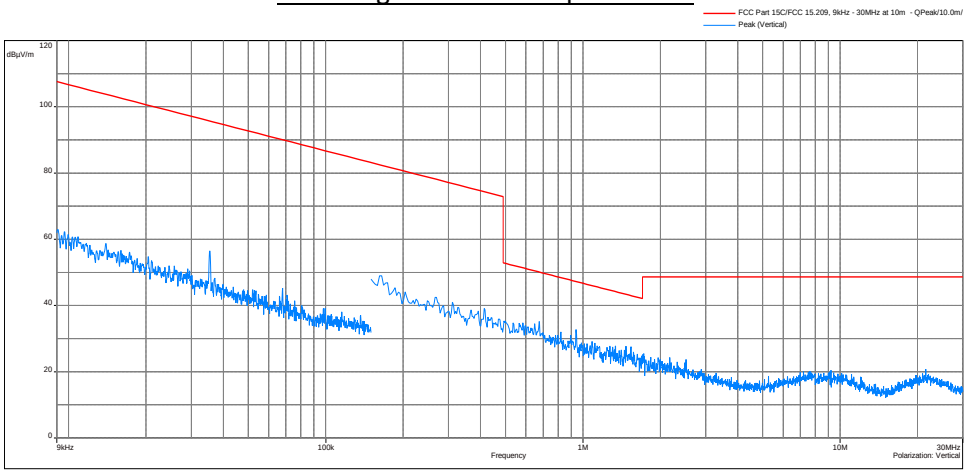
Receiving Antenna - Flat



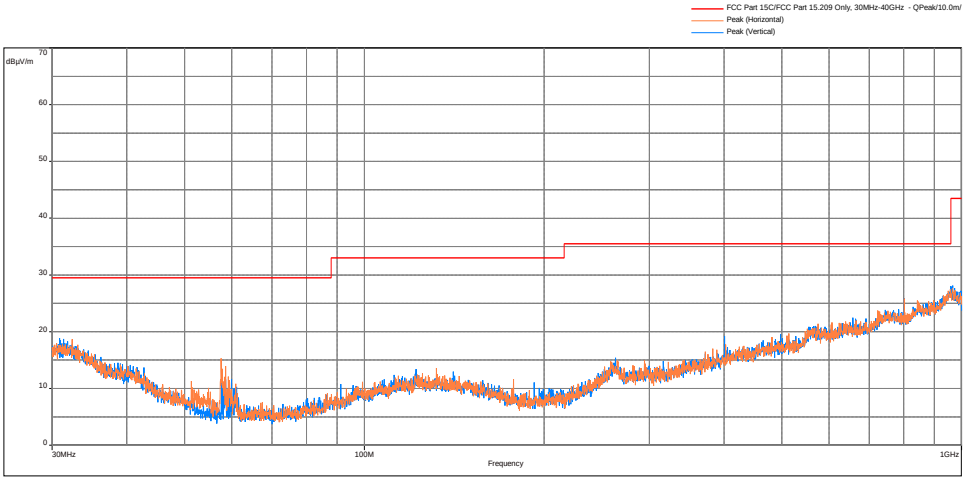
Receiving Antenna – Parallel



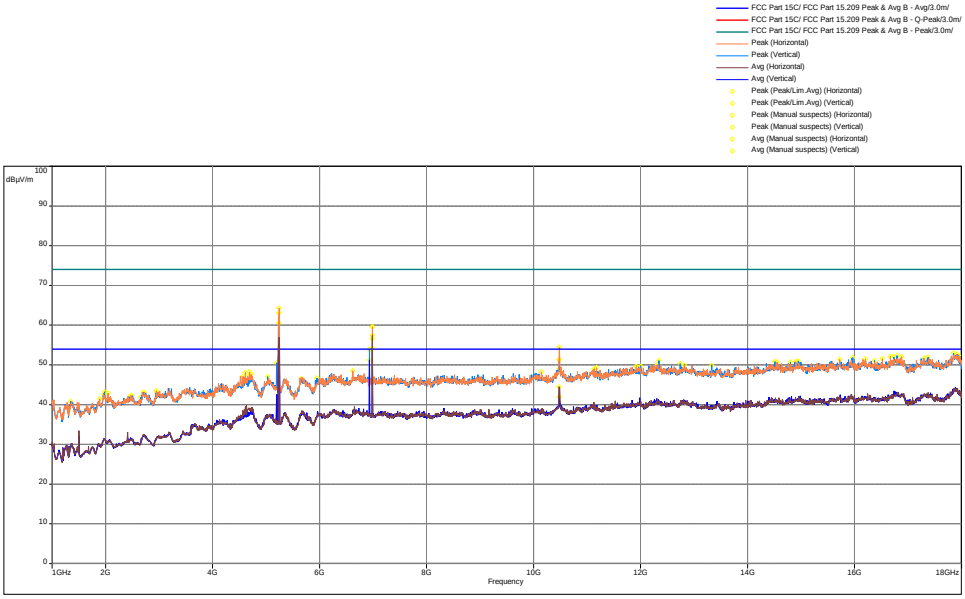
Receiving Antenna – Perpendicular



Radiated Spurious Emissions 30 MHz to 1000 MHz, Peak Scan



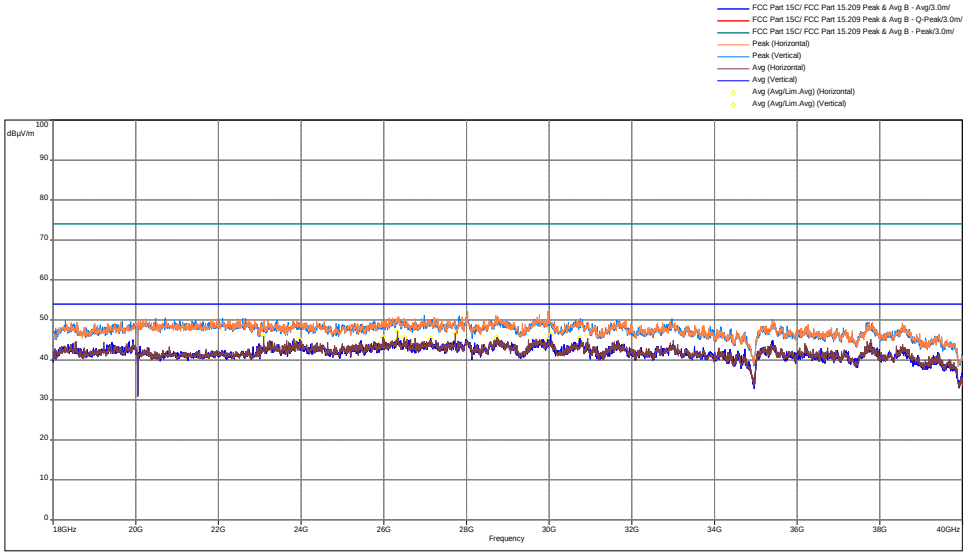
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan & Avg Scan vs Peak & Avg Limit



Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Avg (dBµV/m)	Lim.Avg (dBµV/m)	Margin (dB)	Height (m)	Angle (°)	Polarization	Correction (dB)
6933.000*	53.92	74	51.23	54	-2.77	1.51	0	Vertical	-2.46
6986.833*	56.60	68.3	-	-	-11.7	2.49	53	Vertical	-2.51
6986.833*	59.60	68.3	-	-	-8.7	2.49	352	Horizontal	-2.51
10478.070	51.33	74	44.50	54	-9.5	2.49	255	Horizontal	-0.49
10479.200	49.10	74	41.96	54	-12.04	2.49	285	Vertical	-0.49

*For emissions outside the 15.205 restricted band, the limit is -27dBm/MHz EIRP (68.3 dBµV/m Peak). As an alternative, compliance can also be demonstrated by meeting the Average (54dBµV/m) and Peak (74dBµV/m) limits of 15.209.

Radiated Spurious Emissions 18000 - 40000 MHz, Peak Scan & Avg Scan vs Peak & Avg Limit

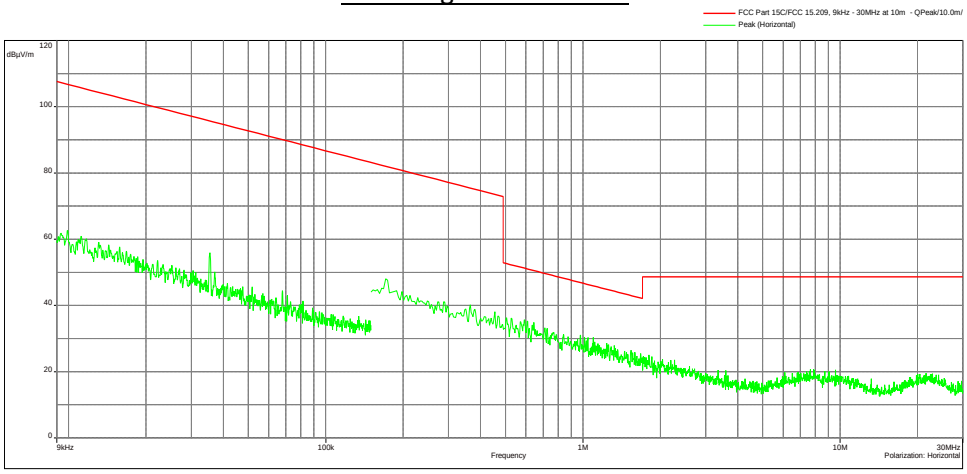


Results	Complies

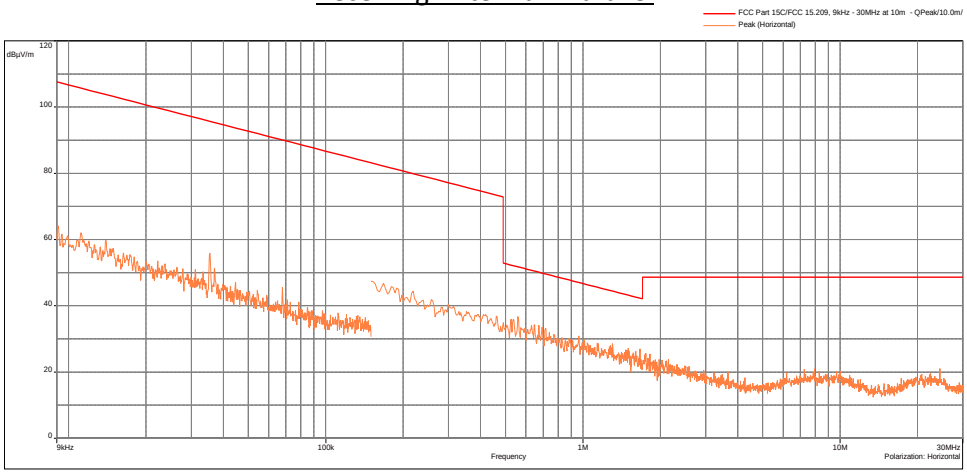
Test Results: 15.209 Radiated Spurious Emissions, Tx at 802.11n 40MHz BW 5270MHz

Radiated Spurious Emissions 9 kHz to 30 MHz, Peak Scan

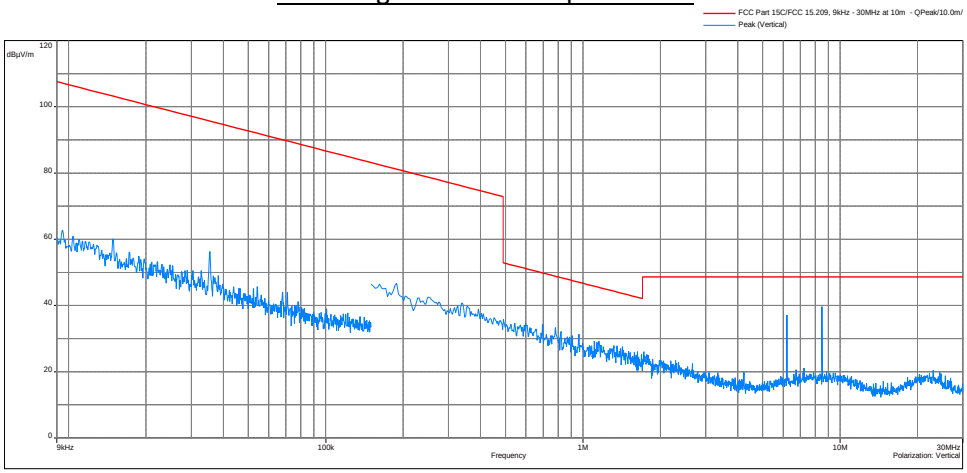
Receiving Antenna - Flat



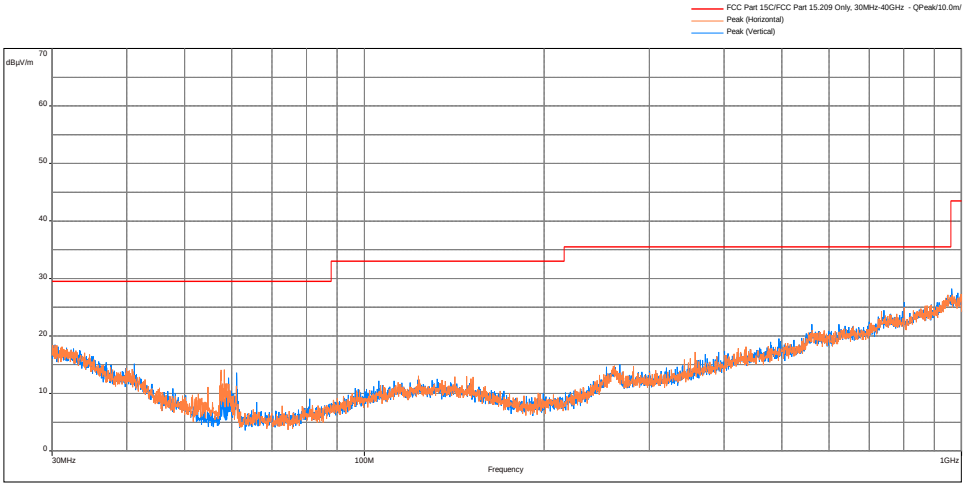
Receiving Antenna – Parallel



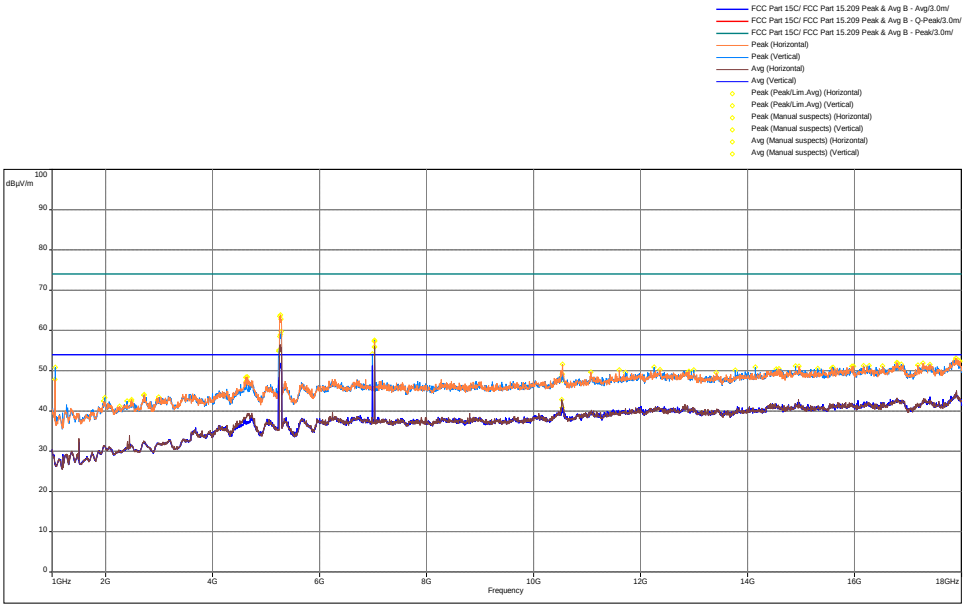
Receiving Antenna – Perpendicular



Radiated Spurious Emissions 30 MHz to 1000 MHz, Peak Scan



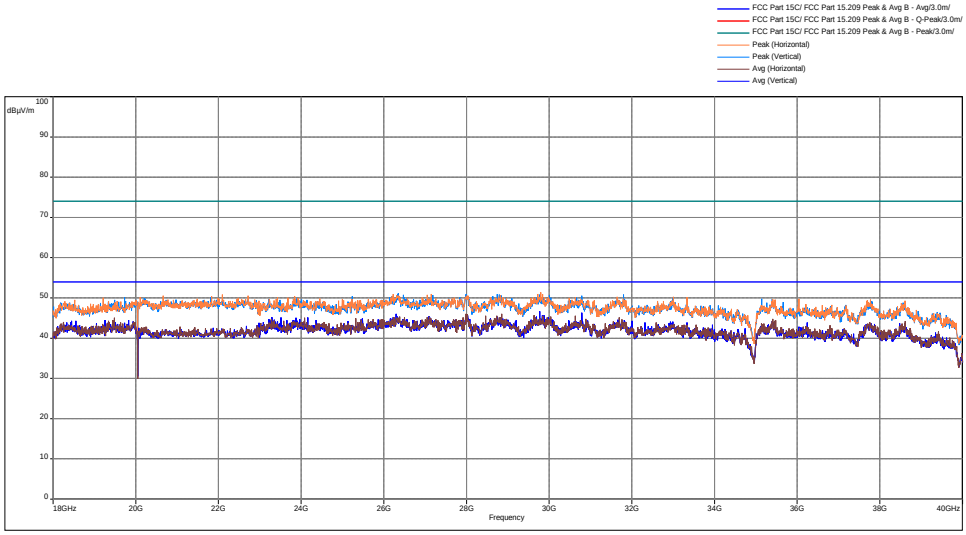
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan & Avg Scan vs Peak & Avg Limit



Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Avg (dBµV/m)	Lim.Avg (dBµV/m)	Margin (dB)	Height (m)	Angle (°)	Polarization	Correction (dB)
7026.500*	57.54	68.3	-	-	-10.76	2.49	61	Vertical	-2.46
7026.500*	57.34	68.3	-	-	-10.96	2.49	174	Horizontal	-2.46
10525.670	51.62	74	42.85	54	-11.15	2.49	245	Horizontal	-0.52
10534.730	49.17	74	40.81	54	-13.19	2.49	89	Vertical	-0.54

*For emissions outside the 15.205 restricted band, the limit is -27dBm/MHz EIRP (68.3 dBµV/m Peak). As an alternative, compliance can also be demonstrated by meeting the Average (54dBµV/m) and Peak (74dBµV/m) limits of 15.209.

Radiated Spurious Emissions 18000 - 40000 MHz, Peak Scan & Avg Scan vs Peak & Avg Limit

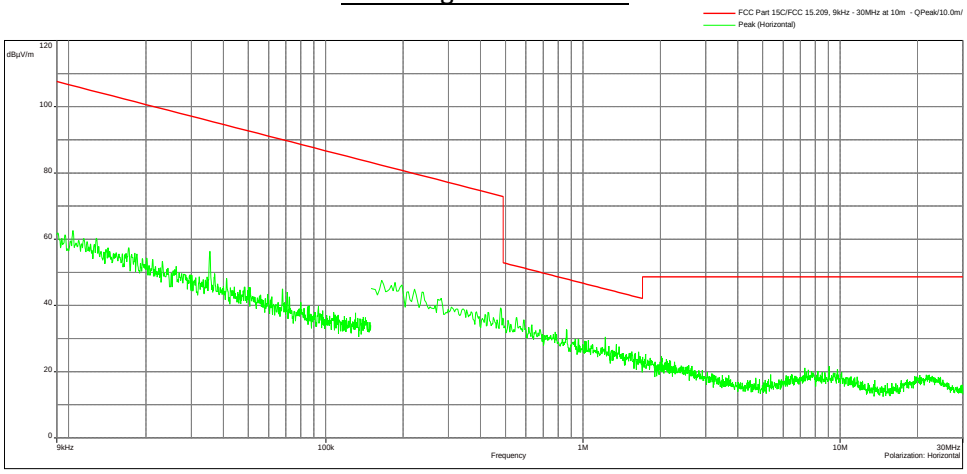


Results	Complies

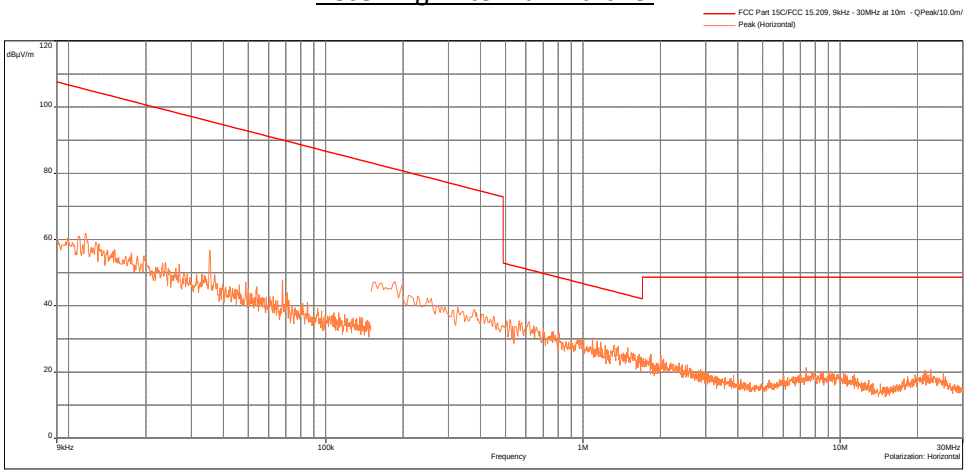
Test Results: 15.209 Radiated Spurious Emissions, Tx at 802.11n 40MHz BW 5310MHz

Radiated Spurious Emissions 9 kHz to 30 MHz, Peak Scan

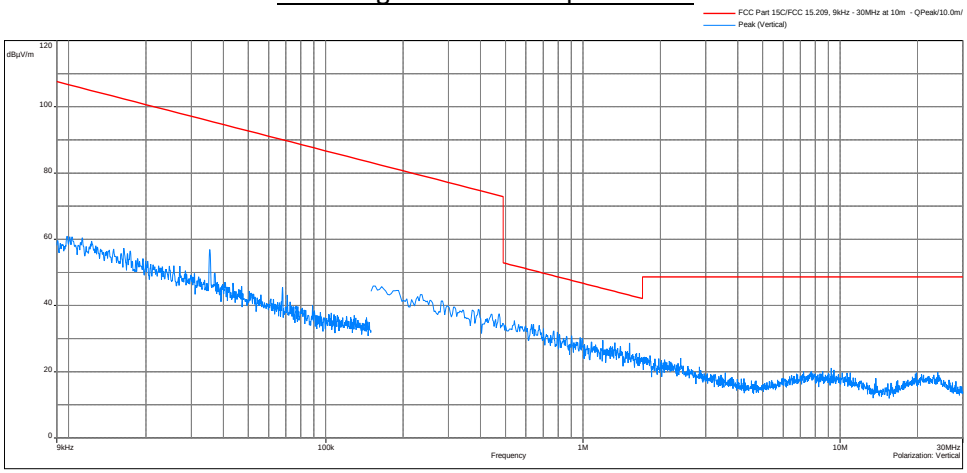
Receiving Antenna - Flat



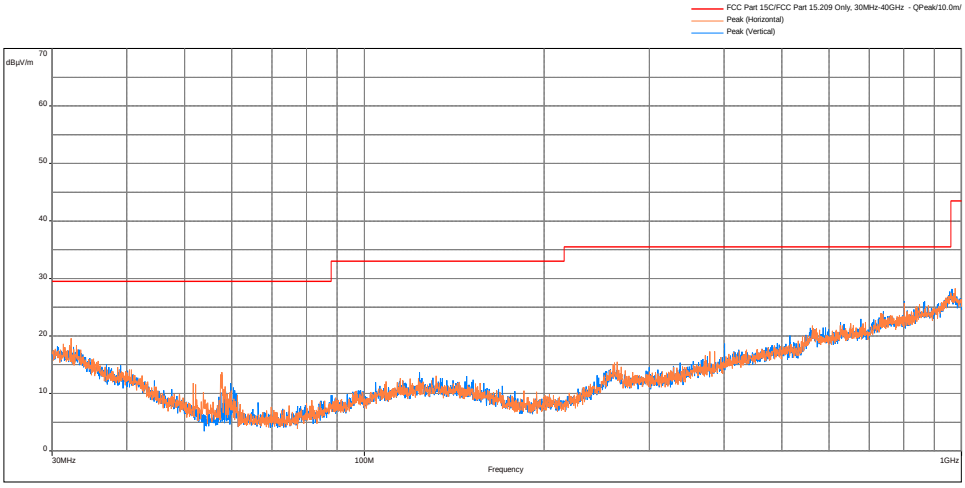
Receiving Antenna – Parallel



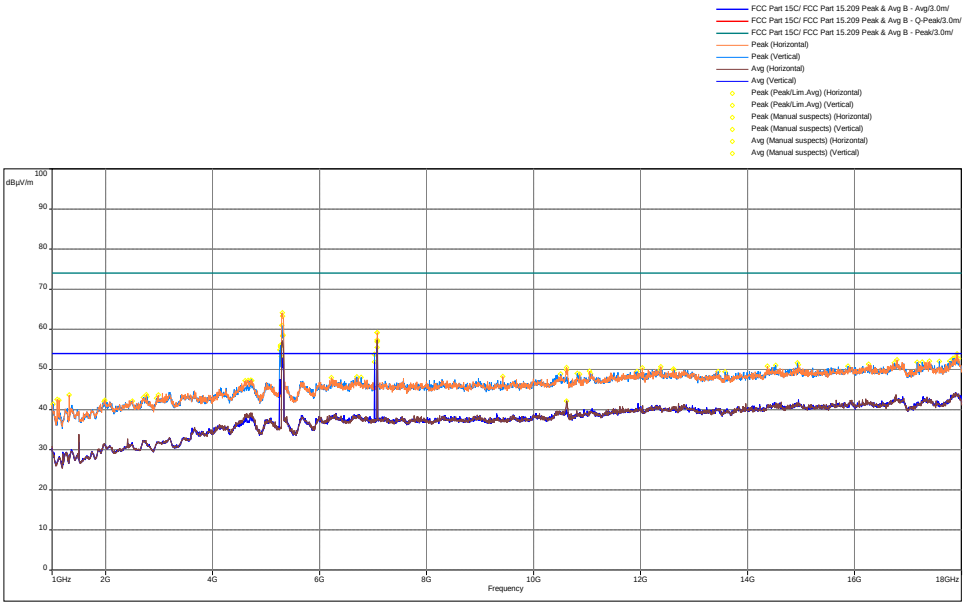
Receiving Antenna – Perpendicular



Radiated Spurious Emissions 30 MHz to 1000 MHz, Peak Scan



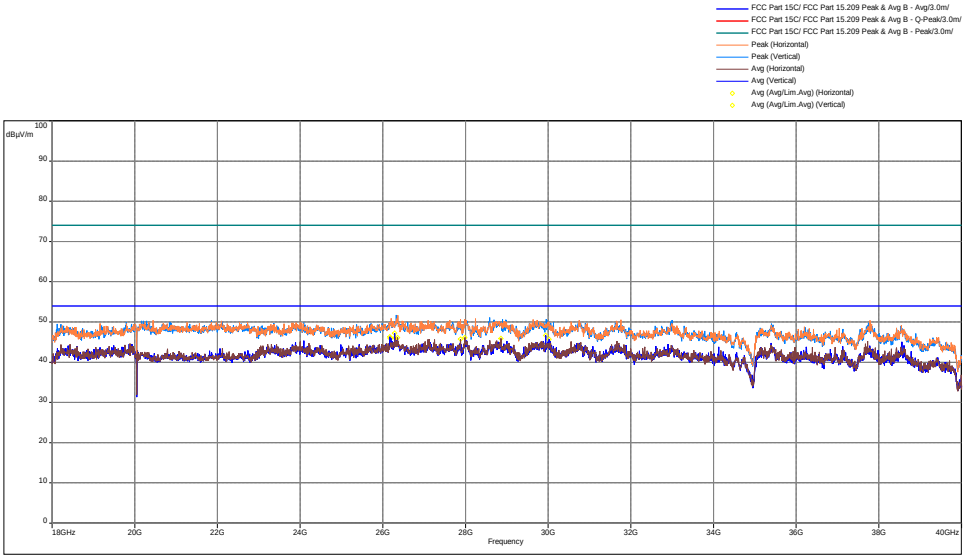
Radiated Spurious Emissions 1000 - 18000 MHz, Peak Scan & Avg Scan vs Peak & Avg Limit



Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Avg (dBµV/m)	Lim.Avg (dBµV/m)	Margin (dB)	Height (m)	Angle (°)	Polarization	Correction (dB)
7026.500*	53.76	74	51.88	54	-2.12	1.51	0	Vertical	-2.46
7079.767*	56.90	68.3	-	-	-11.4	2.49	70	Vertical	-2.39
7079.767*	59.17	68.3	-	-	-9.13	2.49	173	Horizontal	-2.39
10614.07	49.88	74	42.15	54	-11.85	2.49	272	Horizontal	-0.67

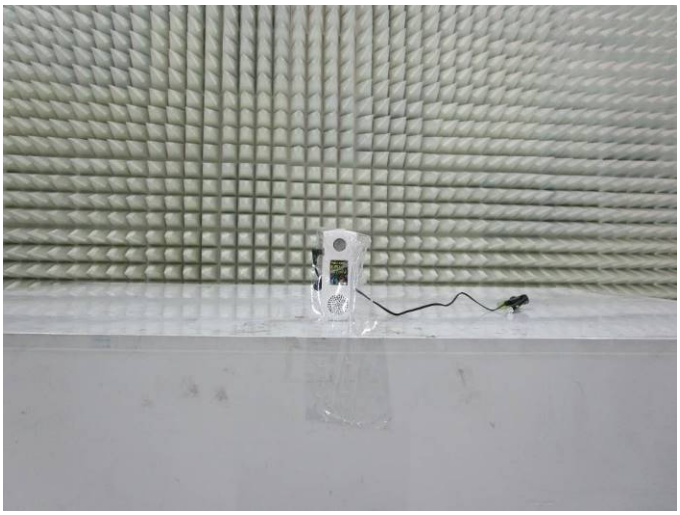
*For emissions outside the 15.205 restricted band, the limit is -27dBm/MHz EIRP (68.3 dBµV/m Peak). As an alternative, compliance can also be demonstrated by meeting the Average (54dBµV/m) and Peak (74dBµV/m) limits of 15.209.

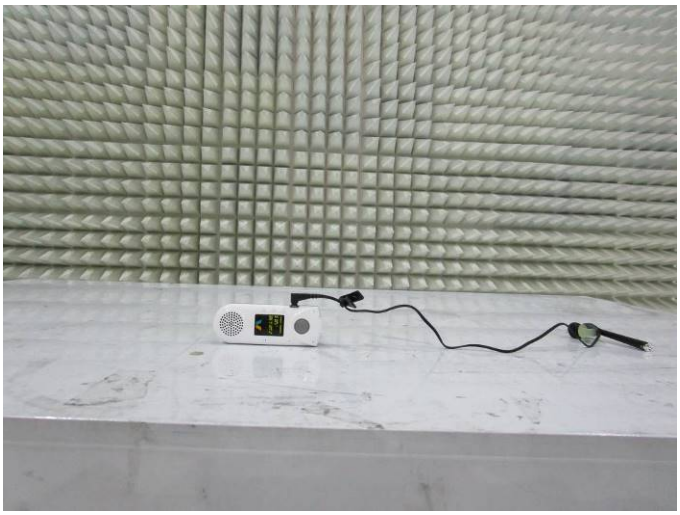
Radiated Spurious Emissions 18000 - 40000 MHz, Peak Scan & Avg Scan vs Peak & Avg Limit

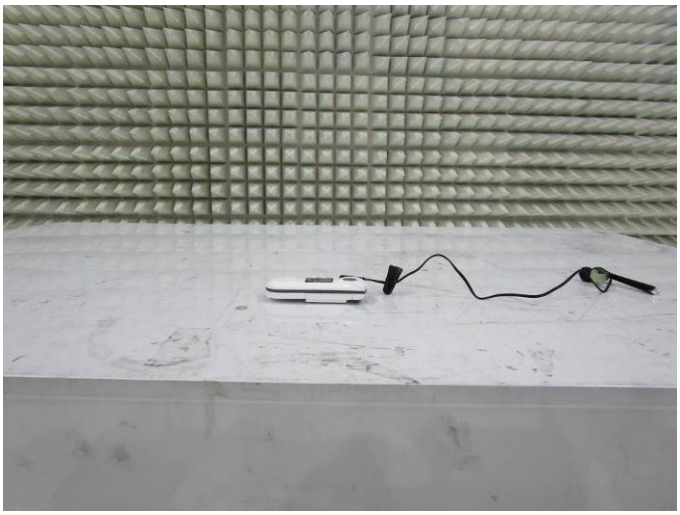


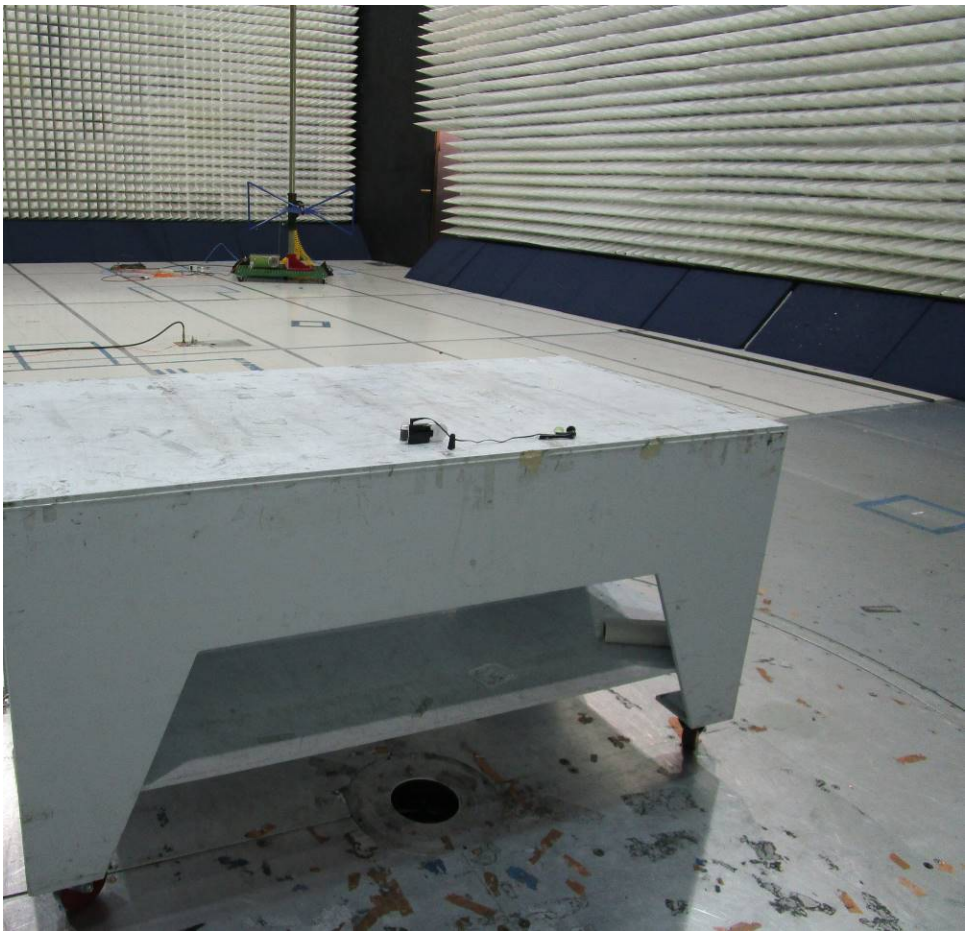
Results	Complies

4.3.7 Test setup









5.0 List of Test Equipment

Measurement equipment used for emission compliance testing utilized the equipment on the following list:

Equipment	Manufacturer	Model/Type	Asset No.	Calibration Interval	Cal Due
Power Meter	Rohde & Schwarz	OSP120	ITS 01193	12	08/19/2021
Environmental Chamber	Espec	BTX-475	ITS 01436	12	10/20/2021
10m chamber	Panashield	10m Semi-Anechoic Chamber	ITS 00984	36	09/11/2021
Spectrum Analyzer	Rohde and Schwarz	FSU	ITS 00913	12	05/11/2021
EMI Receiver	Rohde and Schwarz	FSW44	ITS 01818	12	07/09/2021
EMI Receiver	Rohde and Schwarz	ESU40	ITS 00961	12	07/31/2021
Horn Antenna (10-40 GHz)	ETS-Lindgren	3116C	ITS 01776	12	10/26/2021
Pre-Amplifier (18-40GHz)	Miteq	TTA1840-35-S-M	ITS 01393	12	03/09/2022
Active Horn Antenna (1-18GHz)	ETS-Lindgren	3117-PA	ITS 01636	12	12/17/2021
Horn Antenna (1-18GHz)	ETS-Lindgren	3115	ITS 00982	12	04/21/2021
BI-Log Antenna	Teseq	CBL6111D	ITS 01505	12	03/22/2022
Pre-Amplifier	Sonoma Instrument	310N	ITS 01714	12	11/13/2021
Loop Antenna	EMCO	6512	ITS 01598	12	11/03/2021
Notch Filter	MICRO-TRONICS	BRM50703	ITS 01167	12	06/11/2021
RF Cable	Megaphase	EMC1-K1K1-236	ITS 1484	12	06/12/2021
RF Cable	Megaphase	TM40-K1K1-59	ITS 01657	12	01/08/2022
RF Cable	TRU Corporation	TRU CORE 300	ITS 01330	12	06/11/2021
RF Cable	TRU Corporation	TRU CORE 300	ITS 01465	12	06/11/2021
RF Cable	TRU Corporation	TRU CORE 300	ITS 01470	12	06/11/2021

Verify before use

Software used for emission compliance testing utilized the following:

Name	Manufacturer	Version	Template/Profile
BAT-EMC	Nexio	3.191.19	Vocera C2PC.bpp
RS Commander	Rohde Schwarz	1.6.4	Not Applicable (Screen grabber)

6.0 Document History

Revision/ Job Number	Writer Initials	Reviewer Initials	Date	Change
1.0 / G104582174	AS	KV	May 10, 2021	Original document

End of Report