FCC / ISED Test Report

For:
Axon Enterprise, Inc.

Brand:
Axon

Model #:
AX1001

Product Description:
Body worn video Camera System supporting Axon Signal Technology at 2.4 GHz and Wi-Fi at 5 GHz and 2.4 GHz.

FCC ID: X4GS00947

Applied Rules and Standards:
47 CFR Part 15.407 (UNII) & 5 GHz (UNII)

REPORT #: EMC_AXONN_012_20001_FCC_15.407_UNII1

DATE: 4/5/2021

A2LA Accredited

IC recognized # 3462B

***CETECOM* Inc.**
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CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

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1 Assessment

The following device was evaluated against the applicable criteria specified in FCC rules Parts 15.407 of Title 47 of the Code of Federal Regulations.

No deviations were ascertained.

According to section 5 of this report, the overall result is Pass.

Company	Description	Model #
Axon Enterprise, Inc.	Body worn video Camera System supporting Axon Signal Technology at 2.4 GHz and Wi-Fi at 5 GHz and 2.4 GHz.	AX1001

Responsible for Testing Laboratory:

Date	Section	Name	Signature
4/5/2021	Compliance	Wang, Kevin (EMC Lab Manager)	kevin.wang@cetecom.com Digitally signed by: kevin.wang@cetecom.com DN: CN = kevin.wang@cetecom.com Date: 2021.04.08 21:29:10 -07'00'

Responsible for the Report:

Date	Section	Name	Signature
4/5/2021	Compliance	Ghanma, Issa (EMC Engineer)	Digitally signed by: Issa W Ghanma DN: CN = Issa W Ghanma email = issa.ghanma@cetecom.com C = US O = CETECOM Inc. OU = EMC Date: 2021.04.08 18:01:27 -07'00'

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
EMC Lab Manager:	Wang, Kevin
Responsible Project Leader:	Sivaraman, Sangeetha

2.2 Identification of the Client

Applicant's Name:	Axon Enterprise, Inc.
Street Address:	17800 N. 85th St
City/Zip Code	Scottsdale, AZ 85255
Country	USA

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as Client /----------
Manufacturers Address:	----------
City/Zip Code	----------
Country	----------

3 Equipment Under Test (EUT)

3.1 EUT Specifications

Model No:	AX1001	
Marketing name:	Axon Body 2	
FCC-ID :	X4GS00947	
HW Version :	Rev L	
SW Version :	Skytest_ab2_v2_mfgtest	
Product Description:	Body worn video Camera System supporting Axon Signal Technology at 2.4 GHz and Wi-Fi at 5 GHz and 2.4 GHz.	
Frequency Range / number of channels:	Frequency Range (MHz)	Channel Number
	5150-5250	36-48 [4]
Modes of Operation / Channel Bandwidths:	IEEE Std. 802.11(a/n)	Data Rate / MCS
	a	6-54 Mbps
	n: HT20	MCS 0-7
Power Supply/ Rated Operating Voltage Range:	Axon Body 2 Li-Ion battery pack, model ID579. Typical capacity 3000mAh. Low 3.0 V DC, Nominal 3.7 V DC, High 4.2 V DC	
Operating Temperature Range:	Low -20º C, High +50º C	
Max. conducted output Power:	+16.76 dBm	
Sample Revision	□ Prototype Unit; ■ Production Unit; □ Pre-Production	
Antenna Information as declared:	❖ Product Name/Number :Antenna HP-VTS01-43100HN • Frequency : 5150~5250 MHz • Polarization : Linear • Impedance : 50 Ohm. • Peak Gain : 5150~5250 MHz→ 3.2 dBi	
Other Radios included in the device:	❖ Bluetooth 4.0 Low Energy ❖ Wi-Fi 2.4 GHz b/g/n ❖ Wi-Fi 5 GHz UNII-3	

3.2 EUT Sample details

EUT #	Serial Number	HW Version	SW Version	Notes/Comments
1	X81665577	Rev L	Skytest_ab2_v2_mfgtest	Conducted measurement
2	X81662891	Rev L	Skytest_ab2_v2_mfgtest	Radiated measurement

3.3 Accessory Equipment (AE) details

AE #	Type	Model	Manufacturer	Serial Number
-	N/A	N/A	N/A	N/A

3.4 Test Sample Configuration

EUT Set-up #	Combination of AE used for test set up	Comments
1	EUT#1	The measurement equipment was connected to the 50 ohm RF port of the EUT.
2	EUT#2	The internal antenna was connected.

3.5 Mode of Operation details

Mode of Operation	Description of Operating modes	Additional Information
Op. 1	Wi-Fi 5 GHz UNII-1 802.11a/n	❖ Putty terminal used to communicate with the device, and sending commands provided by client, that will not available to end-user, to configure the Wi-Fi radio: ▪ Power level: 17 dBm ▪ Mode: a/n ▪ Transmit mode: Continuous TX ▪ Duty cycle: 100% ▪ Hopping: No ▪ Hopping Type: Single Frequency ▪ Channel: Low , Mid, High ▪ Data rate
Op. 2	Wi-Fi 5 GHz UNII-1 802.11a	❖ Putty terminal used to communicate with the device, and sending commands provided by client, that will not be available to end-user, to configure the Wi-Fi radio: ▪ Power level: 17 dBm ▪ Mode: a ▪ Transmit mode: Continuous TX ▪ Duty cycle: 100% ▪ Hopping: No ▪ Hopping Type: Single Frequency ▪ Channel: Low , Mid, High ▪ Data rate

3.6 Justification for Worst Case Mode of Operation

During the testing process, the EUT was tested with transmitter sets on low, mid and high channels, and highest possible duty cycle and output power.

For radiated measurements;

- All data in this report show the worst case of Wi-Fi radio at the highest output power band representing worst case transmission mode.
- All data in this report show the worst case between horizontal and vertical antenna polarizations and for all orientations of the EUT.

4 Subject of Investigation

The objective of the measurements done by CETECOM Inc. was to assess the performance of the EUT according to the relevant requirements specified in FCC rules Part 15.407 of Title 47 of the Code of Federal Regulations.

This test report is to support a request for new equipment authorization under:

- FCC ID: X4GS00947

5 Measurement Results Summary

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	NA	NP	Result
§15.407(e)	Emission Bandwidth	Nominal	Op.1	■	☐	☐	Complies
§15.407(a)	Power Spectral Density	Nominal	Op.1	■	☐	☐	Complies
§15.407(a)	Maximum Output Power	Nominal	Op.1	■	☐	☐	Complies
§15.407; 15.205	Band Edge Compliance	Nominal	Op.1	■	☐	☐	Complies
§15.407(g); 2.1055	Frequency Stability	Extreme conditions	Op.1	■	☐	☐	Complies
§15.407(b); §15.209; 15.205	Radiated TX Spurious Emissions	Nominal	Op.2	■	☐	☐	Complies
§15.207(a)	AC Conducted Emissions	Nominal	-	☐	■	☐	Note 1 Note 2

Note 1: NA= Not Applicable; NP= Not Performed.
Note 2: The EUT is a vehicular device powered by DC main; hence this test is not applicable.

6 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus, with 95% confidence interval (in dB delta to result), based on a coverage factor k=1.

Radiated measurement

9 kHz to 30 MHz	±2.5 dB (Magnetic Loop Antenna)
30 MHz to 1000 MHz	±2.0 dB (Biconilog Antenna)
1 GHz to 40 GHz	±2.3 dB (Horn Antenna)

According to TR 102 273 a multiplicative propagation of error is assumed for RF measurement systems. For this reason the RMS method is applied to dB values and not to linear values as appropriate for additive propagation of error. Also used: http://physics.nist.gov/cuu/Uncertainty/typeb.html. The above calculated uncertainties apply to direct application of the Substitution method. The Substitution method is always used when the EUT comes closer than 3 dB to the limit.

6.1 Environmental Conditions During Testing:

The following environmental conditions were maintained during the course of testing:

- Ambient Temperature: 20-25° C
- Relative humidity: 40-60%

6.2 Dates of Testing:

12/28/2020 – 1/22/2021

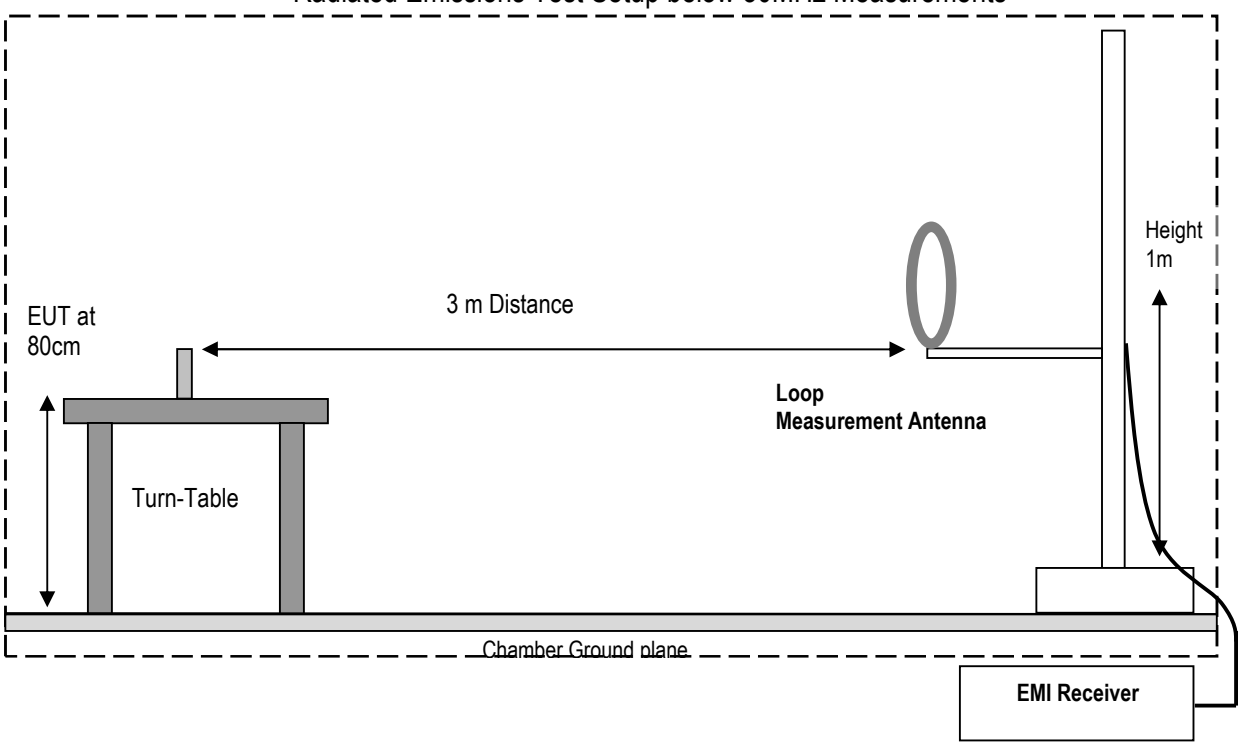
7 Measurement Procedures

7.1 Radiated Measurement

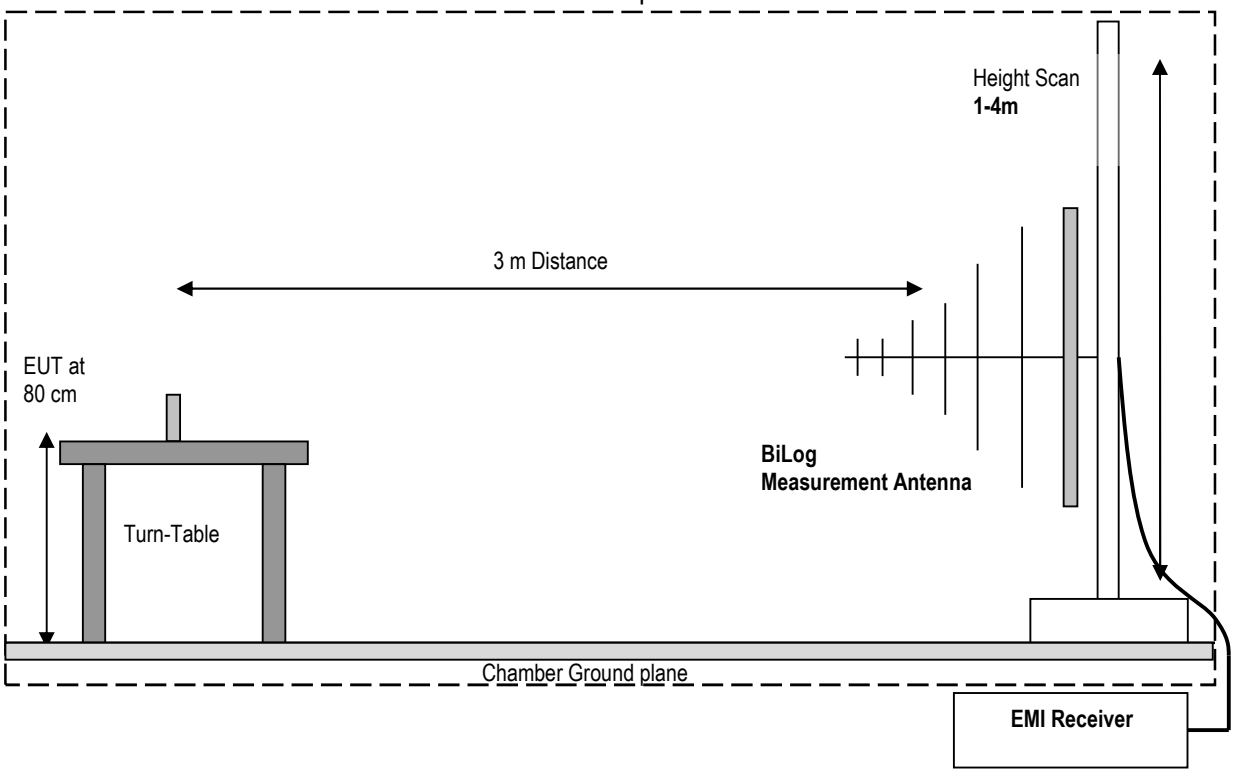
The radiated measurement is performed according to ANSI C63.10 (2013)

- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT, and both antenna polarizations. This procedure exceeds the requirement of the above standards to cover the 3 orthogonal axes of the EUT. A max peak detector is utilized during the exploratory measurement. The Test-SW creates an overall maximum trace for all 12 sweeps and saves the settings for each point of this trace. The maximum trace is part of the test report.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then put through the final measurement and again maximized in a 90deg range of the turntable, fine search in the frequency domain and height scan between 1m and 4m.
- The above procedure is repeated for all possible ways of power supply to EUT and all supported modulations.
- In case there are no emissions above the noise floor level only the maximum trace is reported as described above.
- The results are split up into up to 4 frequency ranges due to antenna bandwidth restrictions. A magnetic loop is used from 9 kHz to 30 MHz, a Biconilog antenna is used from 30 MHz to 1 GHz, and two different horn antennas are used to cover frequencies up to 40 GHz.

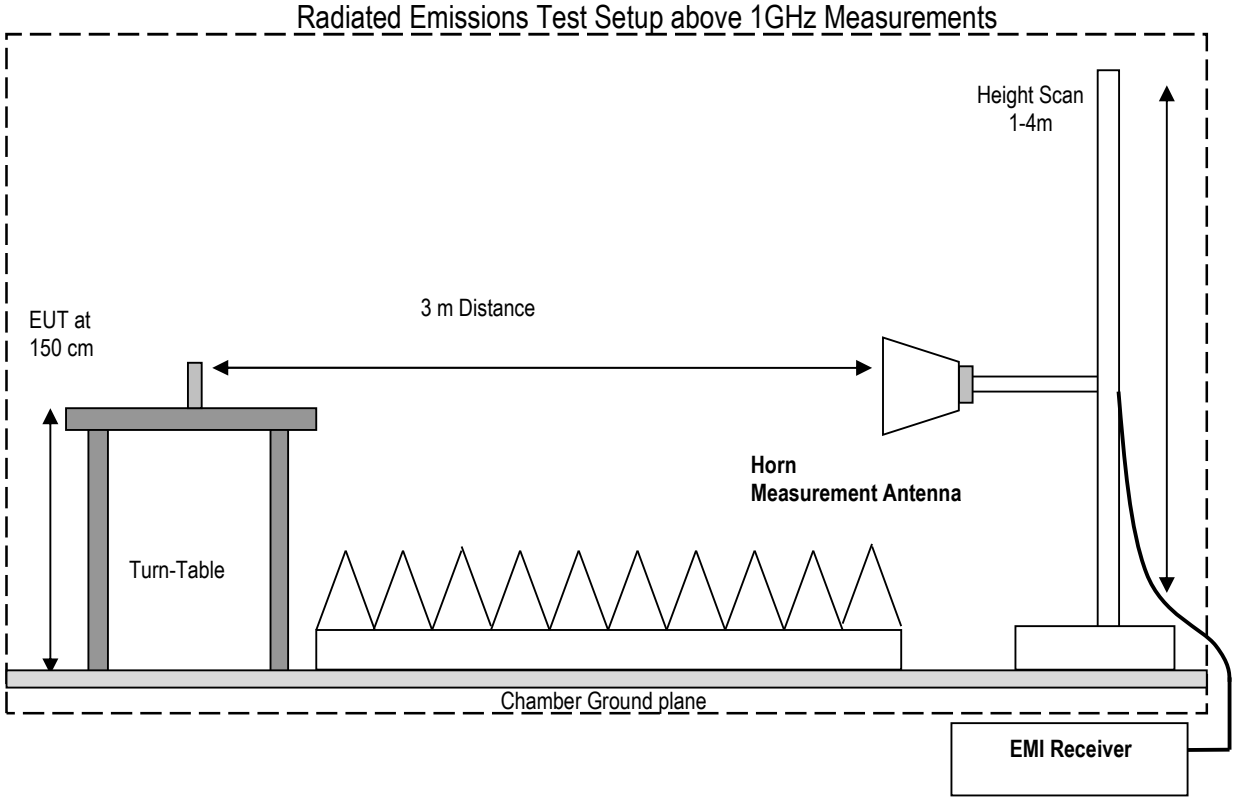
Radiated Emissions Test Setup below 30MHz Measurements



Radiated Emissions Test Setup 30MHz-1GHz Measurements



Radiated Emissions Test Setup above 1GHz Measurements



7.1.1 Sample Calculations for Field Strength Measurements

Field Strength is calculated from the Spectrum Analyzer/ Receiver readings, taking into account the following parameters:

1. Measured reading in dBµV
2. Cable Loss between the receiving antenna and SA in dB and
3. Antenna Factor in dB/m

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the following equation:

FS (dBµV/m) = Measured Value on SA (dBµV) + Cable Loss (dB) + Antenna Factor (dB/m)

Example:

Frequency (MHz)	Measured SA (dBµV)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dBµV/m)
1000	80.5	3.5	14	98.0

7.2 RF Conducted Measurement Procedure

Testing procedures are based on 558074 D01 15.247 Meas Guidance v05r02 – "GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES" - April 2, 2019, by the Federal Communications Commission, Office of Engineering and Technology, Laboratory Division.

- Connect the equipment as shown in the above diagram.
- Adjust the settings of the SA (Rohde-Schwarz Spectrum Analyzer) to connect the EUT at the required mode of test.
- Measurements are to be performed with the EUT set to the low, middle, and high channels and for worst-case modulation schemes.

8 Test Result Data

8.1 Duty cycle

8.1.1 Measurement according to FCC 789033 D02 General UNII Test Procedures New Rules v02r01;

DUTY CYCLE, TRANSMISSION FURATION AND MAXIMU POWER CONROL LEVEL

Measurements of duty cycle and transmission duration shall be performed using one of the following technique:

2) The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on-and off-times of transmitted signal.

I. Set the center frequency of the instrument to the center frequency of the transmission.
II. Set RBW ≥ EBW if possible; otherwise, set RBW to the largest available value.
III. Set VBW ≥ RBW.
IV. Set detector = peak or average.
V. The zero-span measurement method shall not be used unless both RBW and VBW are >50/T, where T is defined in item a1) of 12.2, and the number of sweep points across duration T exceeds 100.

(For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if T ≥ 16.7 microseconds.)

8.1.2 Test conditions and setup:

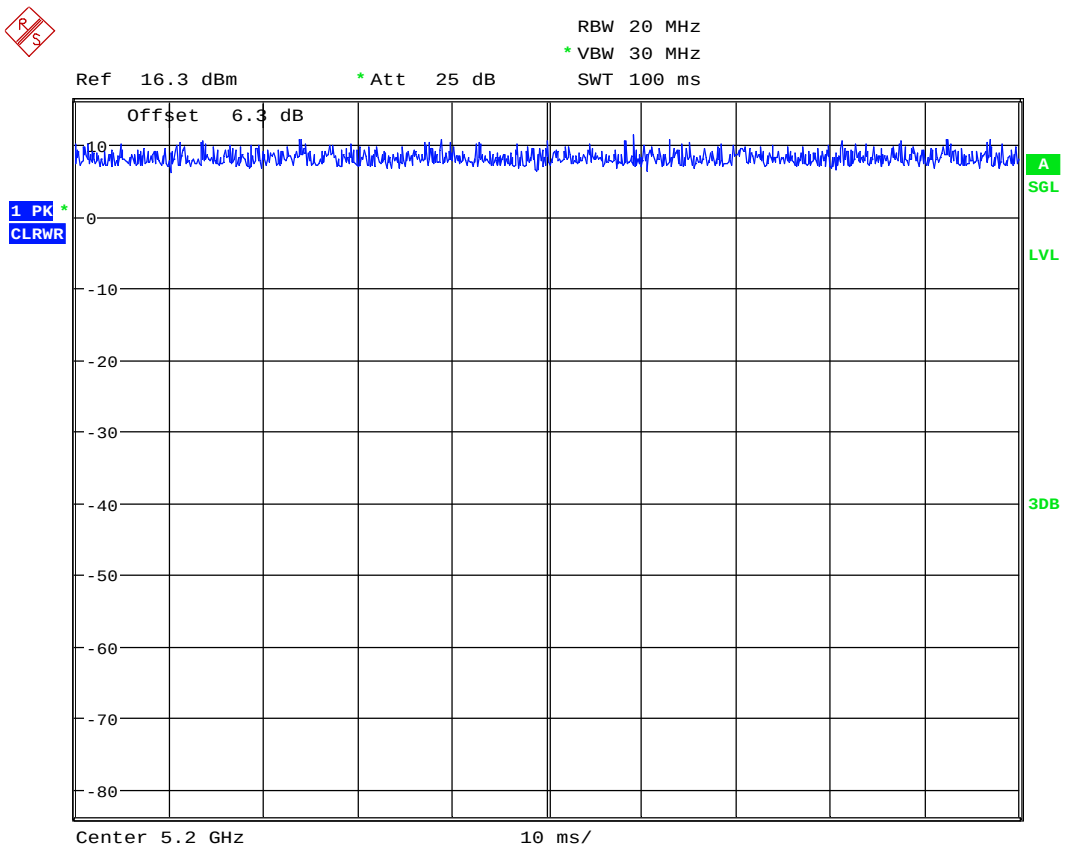
Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
23.8°C	1	Op.1	3.7 V DC

8.1.3 Measurement result:

Plot #	Mode	TX Frequency	Data Rate	Duty cycle
1	802.11a	5180 MHz	6 Mb/s	≥ 98.0 %
2	802.11n_HT20	5180 MHz	MCS0	≥ 98.0 %

Plot # 1

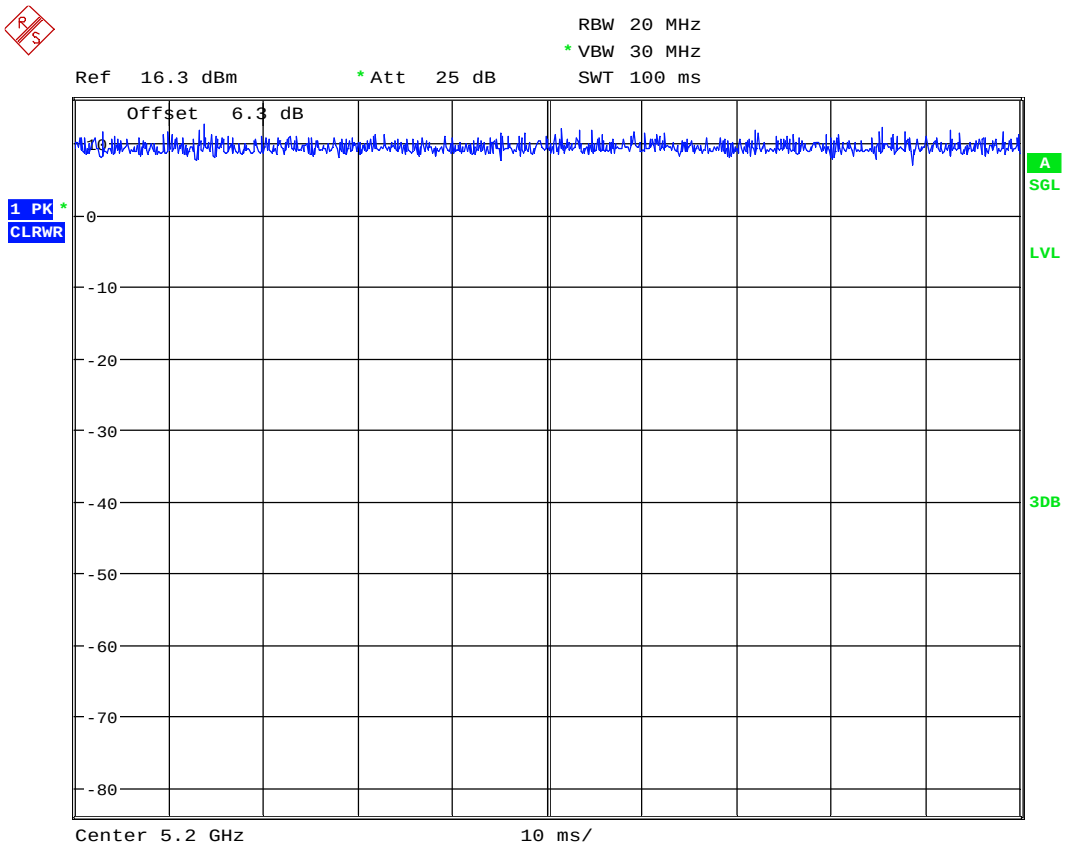
Channel: 36	Mode: 802.11a	TX Frequency: 5200 MHz



Date: 29.DEC.2020 12:32:41

Plot # 2

Channel: 40	Mode: 802.11n_HT20	TX Frequency: 5200 MHz



Date: 29.DEC.2020 12:37:27

8.2 Maximum Conducted Output Power

8.2.1 Measurement according to FCC 789033 D02 General UNII Test Procedures New Rules v02r01

Spectrum Analyzer settings for method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep):

I. Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.
II. Set RBW = 1 MHz
III. Set the VBW ≥ 3 MHz
IV. Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
V. Sweep time = Auto Couple
VI. Detector = power averaging (rms), if available. Otherwise, use sample detector mode.
VII. If transmit duty cycle < 98%, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98%, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run."
VIII. Trace mode = Trace average at least 100 traces in power averaging (rms) mode.
IX. Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.

8.2.2 Limits:

FCC§15.407

Sub-band 5150-5250 MHz

I. For Client Devices 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.

Note: All limits are conducted. 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.

8.2.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input	Antenna Gain
23.8°C	1	Op.1	3.7 V DC	3.2 dBi

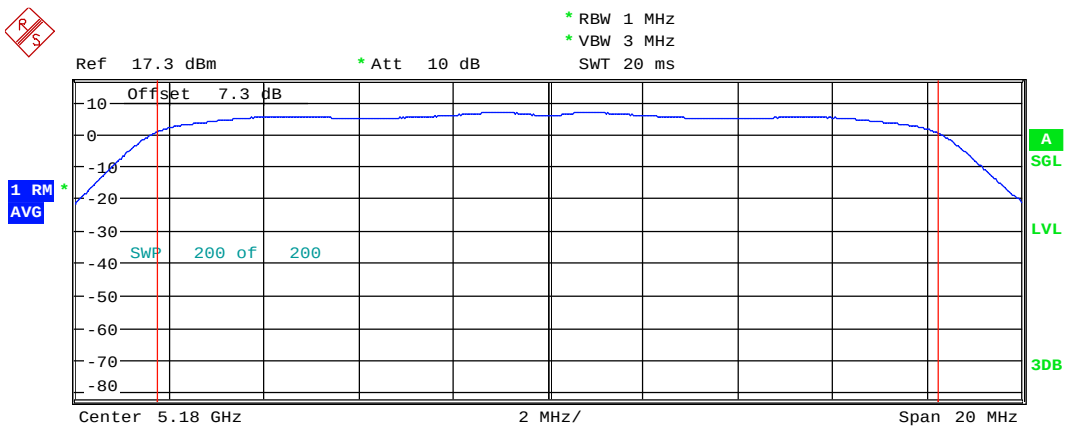
8.2.4 Measurement result:

802.11a						
Plot #	Channel	Frequency (MHz)	Measured conducted output Power (dBm)	EIRP (dBm)	Limit	Result
3	36	5180	16.68	19.88	See Section 8.2.2	Pass
4	40	5200	16.76	19.96	See Section 8.2.2	Pass
5	48	5240	16.29	19.49	See Section 8.2.2	Pass

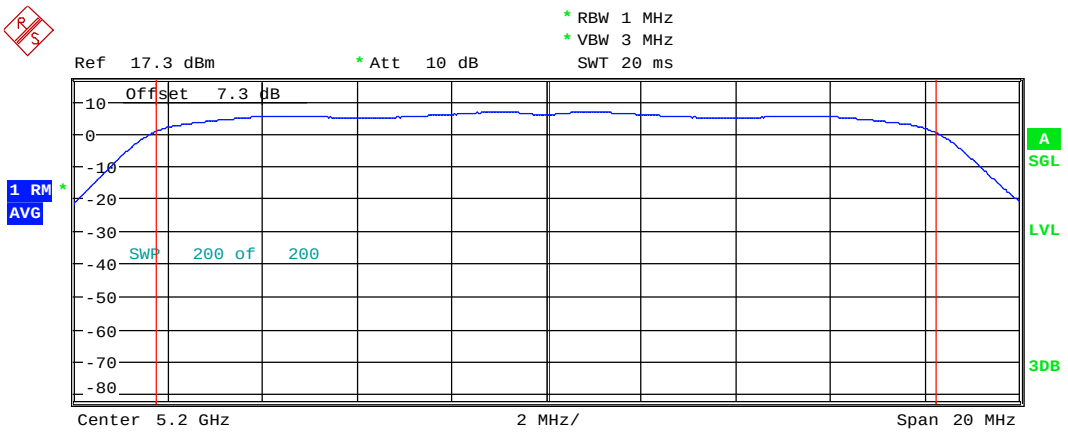
802.11n_HT20						
Plot #	Channel	Frequency (MHz)	Measured conducted output Power (dBm)	EIRP (dBm)	Limit	Result
6	36	5180	16.62	19.82	See Section 8.2.2	Pass
7	40	5200	16.49	19.69	See Section 8.2.2	Pass
8	48	5240	16.09	19.29	See Section 8.2.2	Pass

8.2.5 Measurement Plots:

Plot # 3		
Channel: 36	Mode: 802.11a	TX Frequency: 5180 MHz

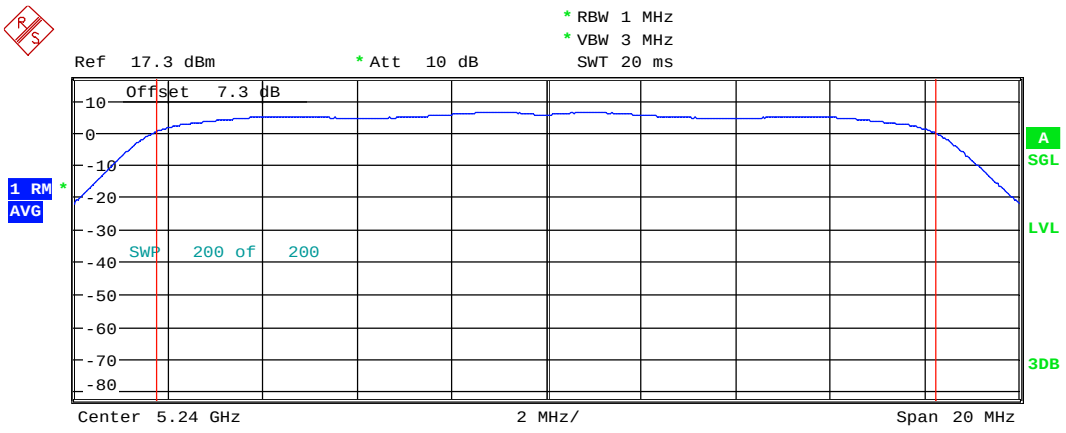


Plot # 4		
Channel: 40	Mode: 802.11a	TX Frequency: 5200 MHz



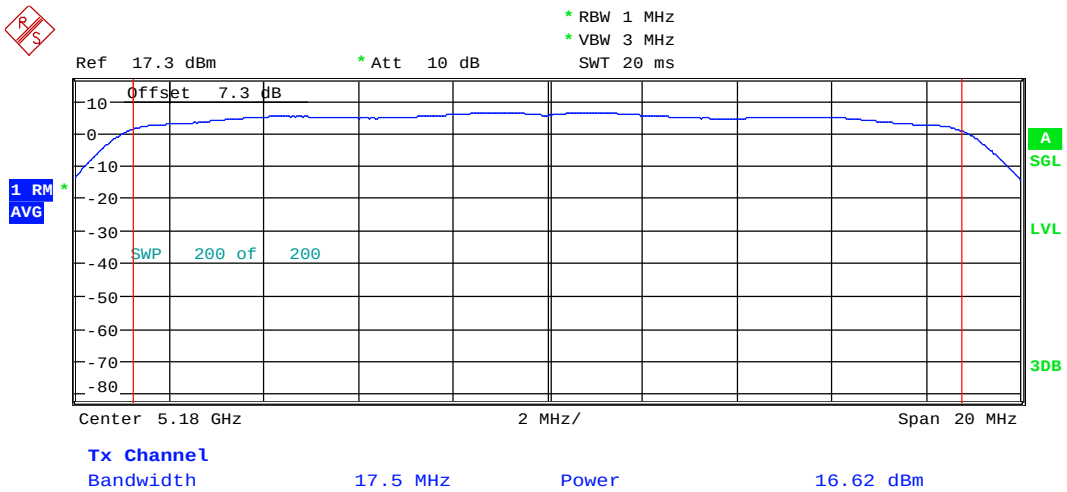
Plot # 5

Channel: 48	Mode: 802.11a	TX Frequency: 5240 MHz

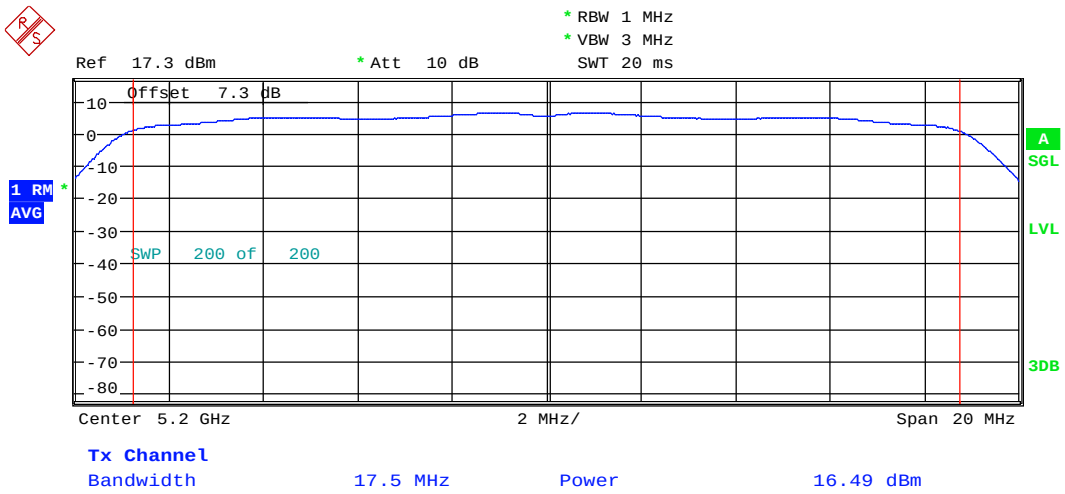


Plot # 6

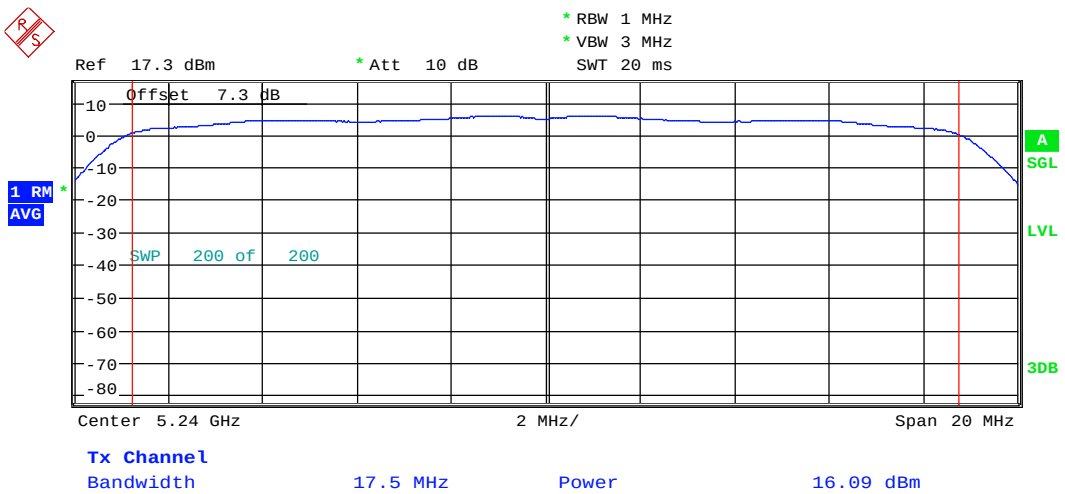
Channel: 36	Mode: 802.11n_HT20	TX Frequency: 5180 MHz



Plot # 7		
Channel: 40	**Mode: 802.11n_HT20**	**TX Frequency: 5200 MHz**



Plot # 8		
Channel: 48	**Mode: 802.11n_HT20**	**TX Frequency: 5240 MHz**



8.3 Power Spectral Density

8.3.1 Measurement according to FCC 789033 D02 General UNII Test Procedures New Rules v02r01

Spectrum Analyzer Settings for Peak PSD in 1 MHz Band with Method SA-1:

I. Use the settings in section 8.2.1
II. Use the peak marker function to determine the maximum amplitude level within the RBW. The result is the Maximum PSD over 1 MHz reference bandwidth

8.3.2 Limits:

FCC§15.407

Sub-band 5150-5250 MHz

I. For Client Devices, the maximum power spectral density shall not exceed 11 dBm in any 1 MHz band

Note: All limits are conducted. 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.

8.3.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input	Antenna Gain
23.8°C	1	Op.1	3.7 V DC	3.2 dBi

8.3.4 Measurement result:

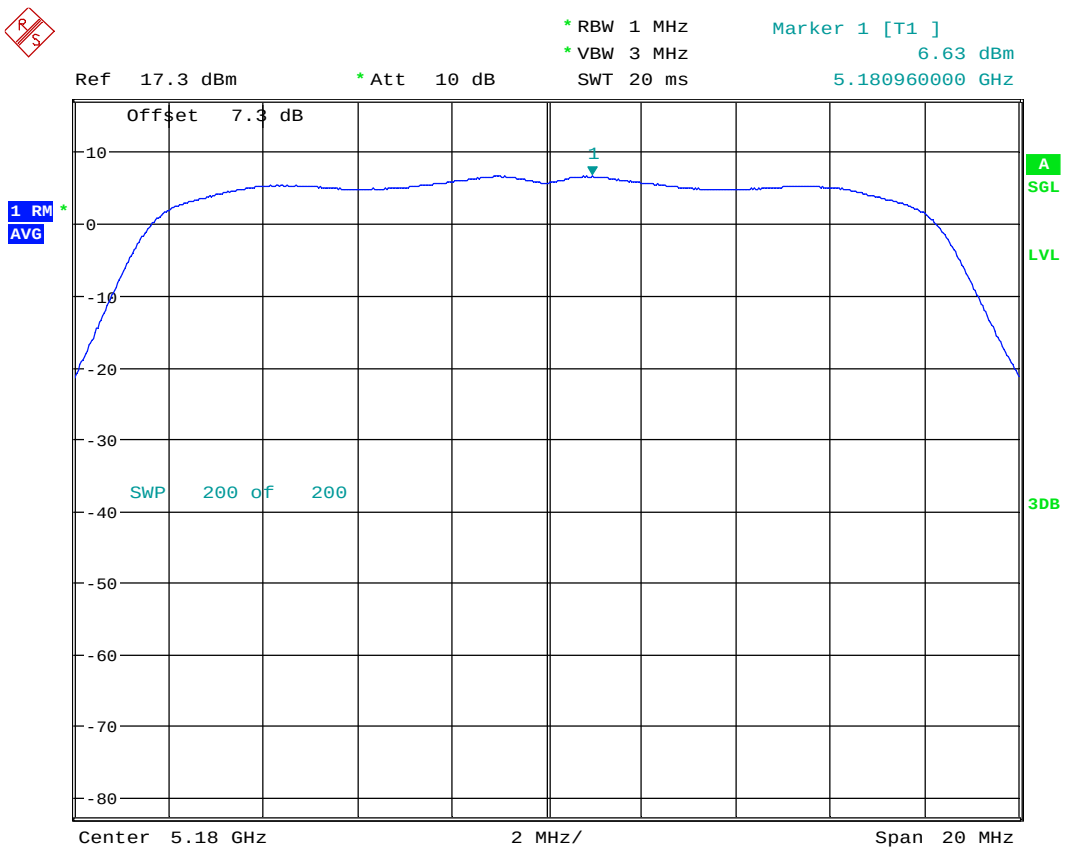
802.11a							
Plot #	Channel	Frequency (MHz)	PSD (dBm)	EIRP (dBm)	Limit (dBm)		Result
					FCC	ISED	
9	36	5180	6.63	9.83	11.00	10.00	Pass
10	40	5200	6.62	9.82	11.00	10.00	Pass
11	48	5240	6.30	9.50	11.00	10.00	Pass

802.11n_HT20							
Plot #	Channel	Frequency (MHz)	PSD (dBm)	EIRP (dBm)	Limit (dBm)		Result
					FCC	ISED	
12	36	5180	6.34	9.54	11.00	10.00	Pass
13	40	5200	6.33	9.53	11.00	10.00	Pass
14	48	5240	6.09	9.29	11.00	10.00	Pass

8.3.5 Measurement Plots:

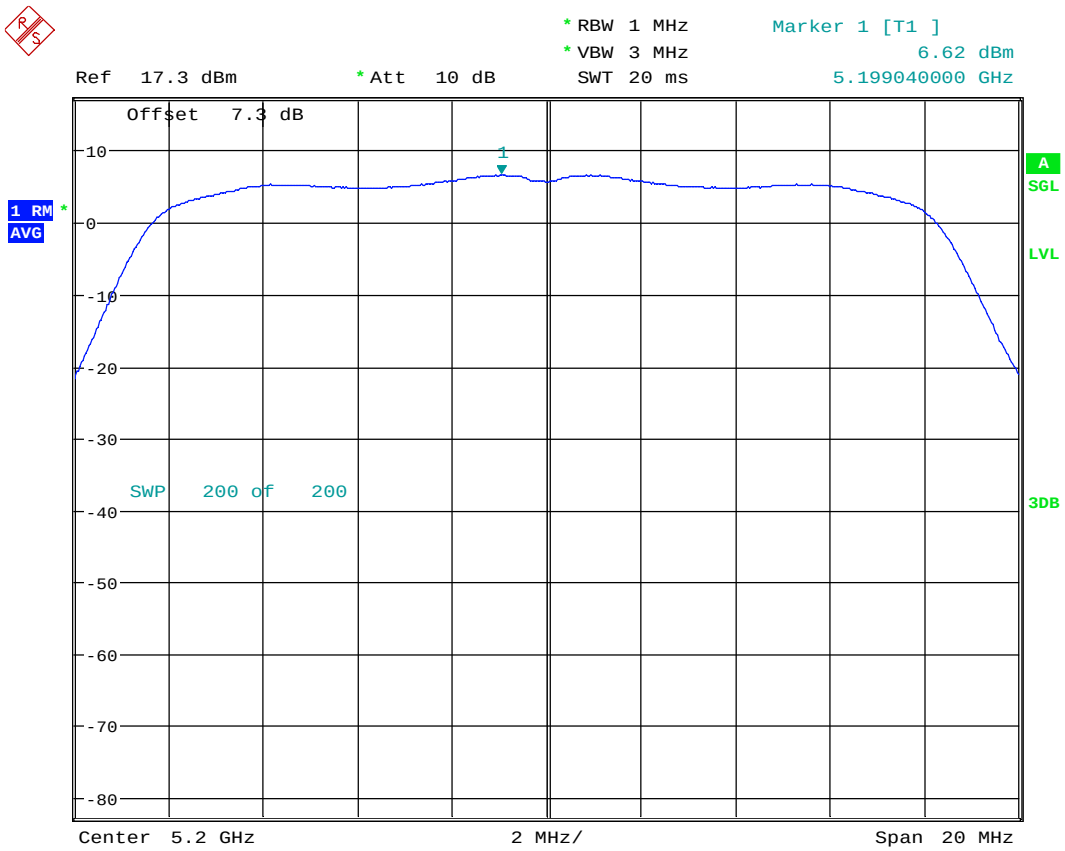
Plot # 9

Channel: 36	Mode: 802.11a	TX Frequency: 5180 MHz



Date: 13.JAN.2021 12:22:36

Plot # 10		
Channel: 40	**Mode: 802.11a**	**TX Frequency: 5200 MHz**



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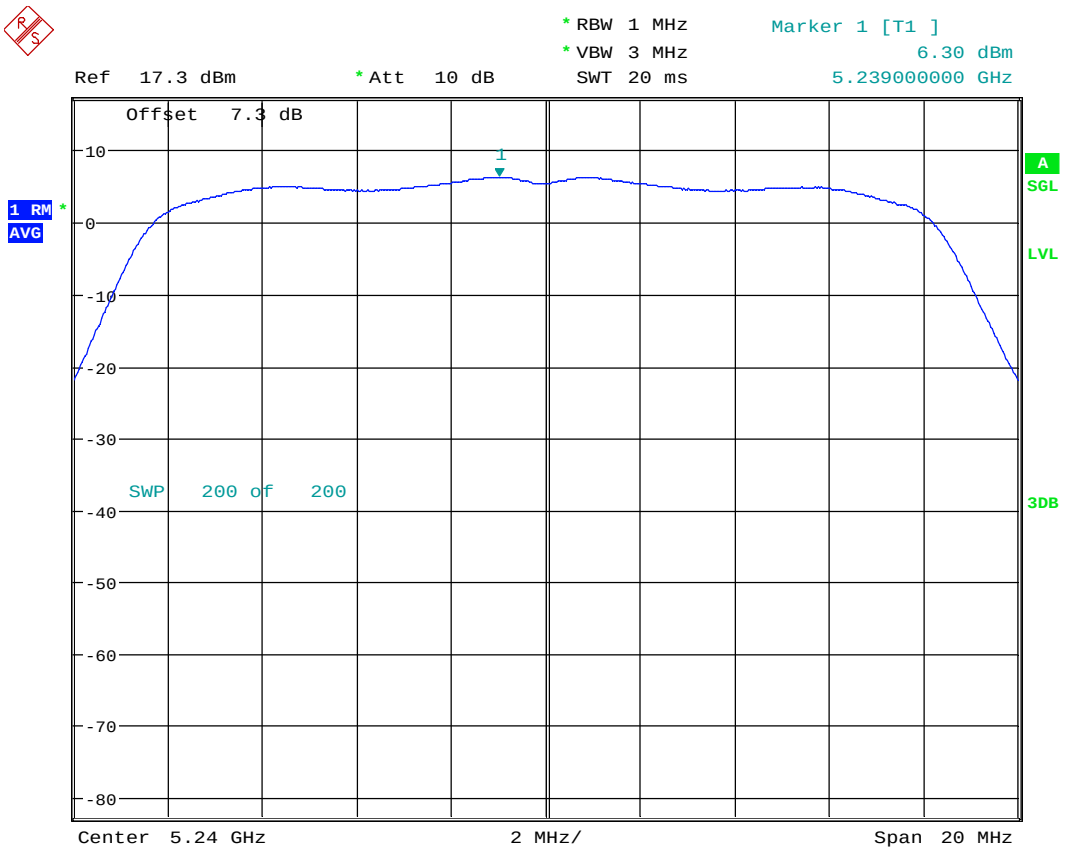
Plot # 11

Channel: 48	Mode: 802.11a	TX Frequency: 5240 MHz



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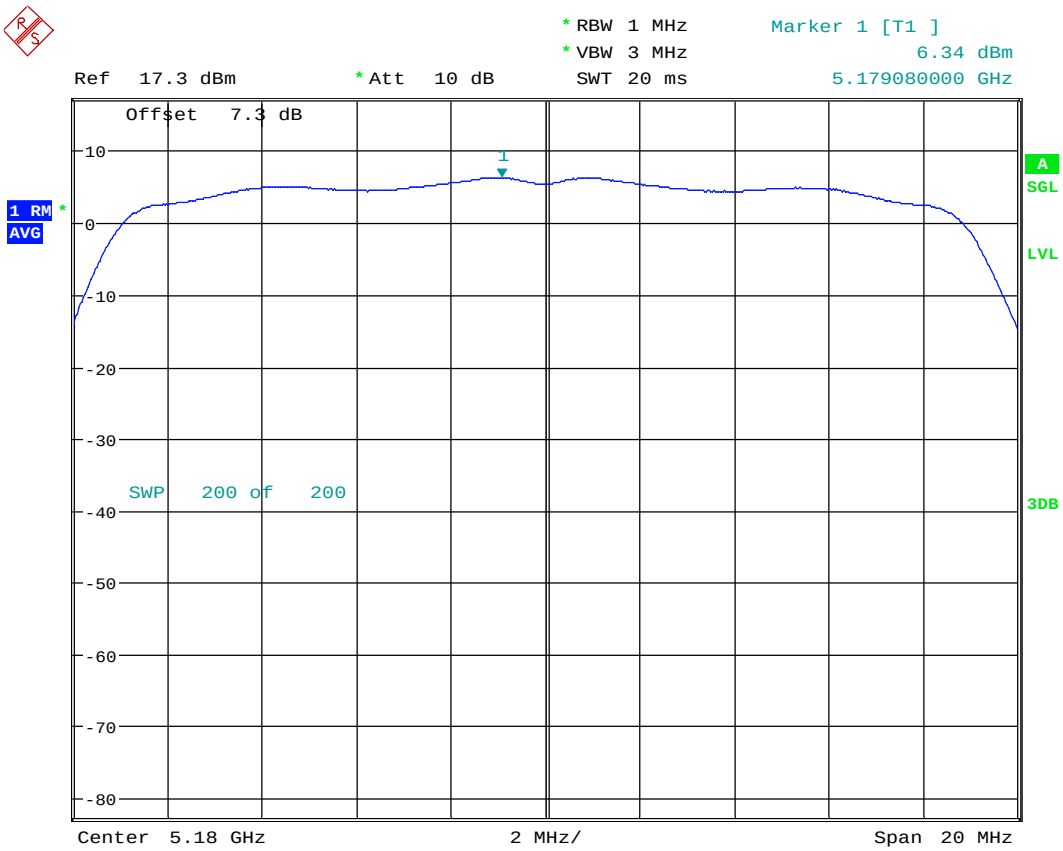
Plot # 12

Channel: 36	Mode: 802.11n_HT20	TX Frequency: 5180 MHz



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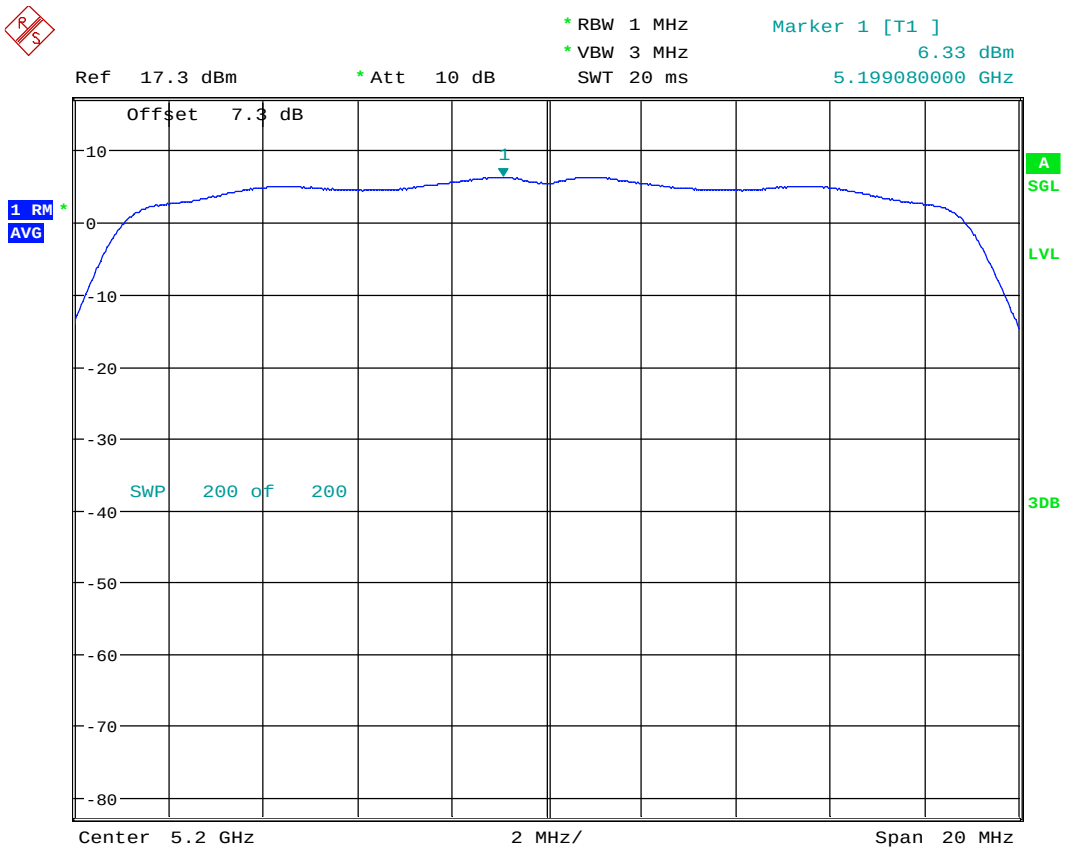
Plot # 13		
Channel: 40	**Mode: 802.11n_HT20**	**TX Frequency: 5200 MHz**



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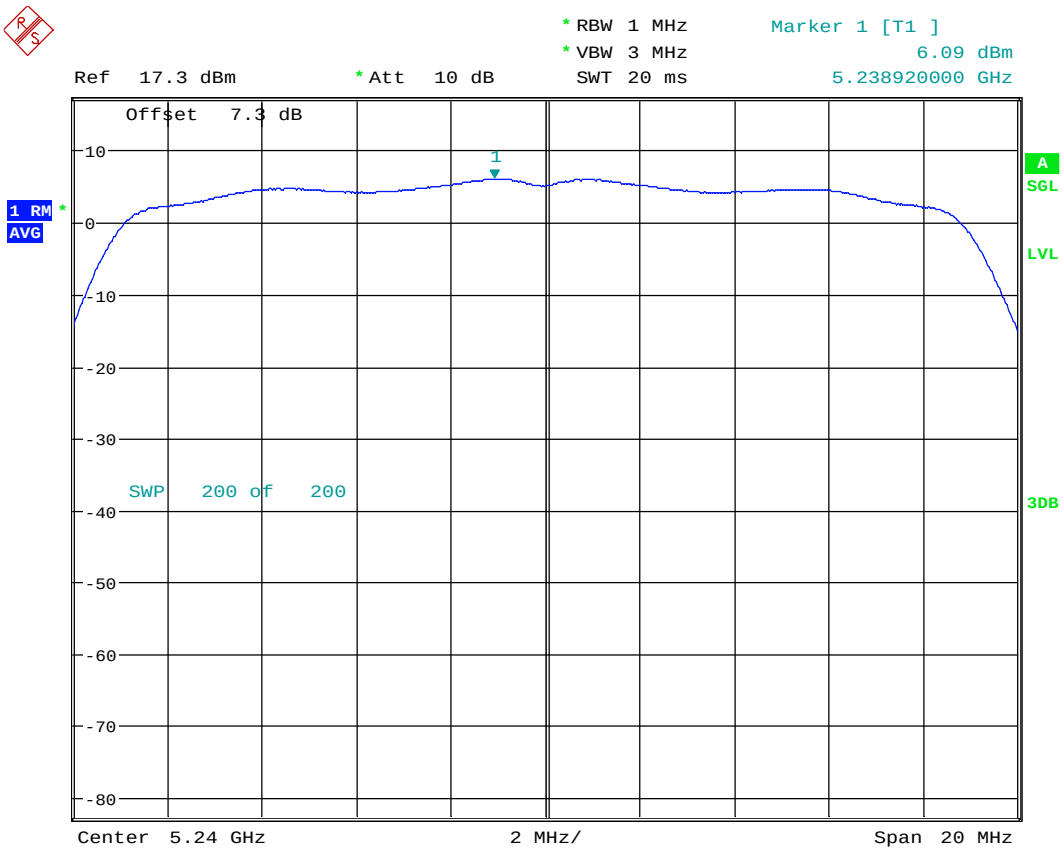
Plot # 14

Channel: 48	Mode: 802.11n_HT20	TX Frequency: 5240 MHz



8.4 Band Edge Compliance

8.4.1 Measurement according to FCC 789033 D02 General UNII Test Procedures New Rules v02r01 and ANSI C63.10 (2013)

Non-Restricted Band Edge and Restricted Band Edge Peak Measurement Spectrum Analyzer Settings:

a) Follow the requirements in II.G.3, "General Requirements for Unwanted Emissions Measurements."
b) Maximum emission levels are measured by setting the analyzer as follows:
(i) RBW = 1 MHz.
(ii) VBW ≥ 3 MHz.
(iii) Detector = Peak.
(iv) Sweep time = auto.
(v) Trace mode = max hold.
(vi) Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle. For example, at 50% duty cycle, the measurement time will increase by a factor of two relative to measurement time for continuous transmission.

Restricted Band Edge Average Measurement Spectrum Analyzer Settings:

a) Follow the requirements in II.G.3. "General Requirements for Unwanted Emissions Measurements."
b) Average emission levels shall be measured using one of the following two methods.
c) Method AD (Average Detection): Primary method
(i) RBW = 1 MHz.
(ii) VBW ≥ 3 MHz.
(iii) Detector = power averaging (rms), if span/(# of points in sweep) ≤ RBW/2. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, the detector mode shall be set to peak.
(iv) Averaging type = power averaging (rms)
(v) Sweep time = auto.
(vi) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, the number of traces shall be increased by a factor of 1/x, where x is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—rather than turning on and off with the transmit cycle, at least 100 traces shall be averaged.)

8.4.2 Limits non-restricted band:

FCC§15.407 (b); RSS-247 6

- 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.

8.4.3 Limits for restricted band §15.407/15.209/15.205 and RSS-Gen 8.9/8.10

- *PEAK LIMIT= 74 dBµV/m @3m =-21.23 dBm
- *AVG. LIMIT= 54 dBµV/m @3m =-41.23 dBm
- Start frequency & stop frequency according to frequency range specified in the restricted band table in FCC section 15.205 & RSS-Gen 8.10

Only spurious emissions are permitted in any of the frequency bands listed below			
MHz	**MHz**	**MHz**	**GHz**
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

8.4.4 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input	Antenna Gain
23.8°C	1	Op.1	3.7 V DC	3.2 dBi

8.4.5 Measurement result:

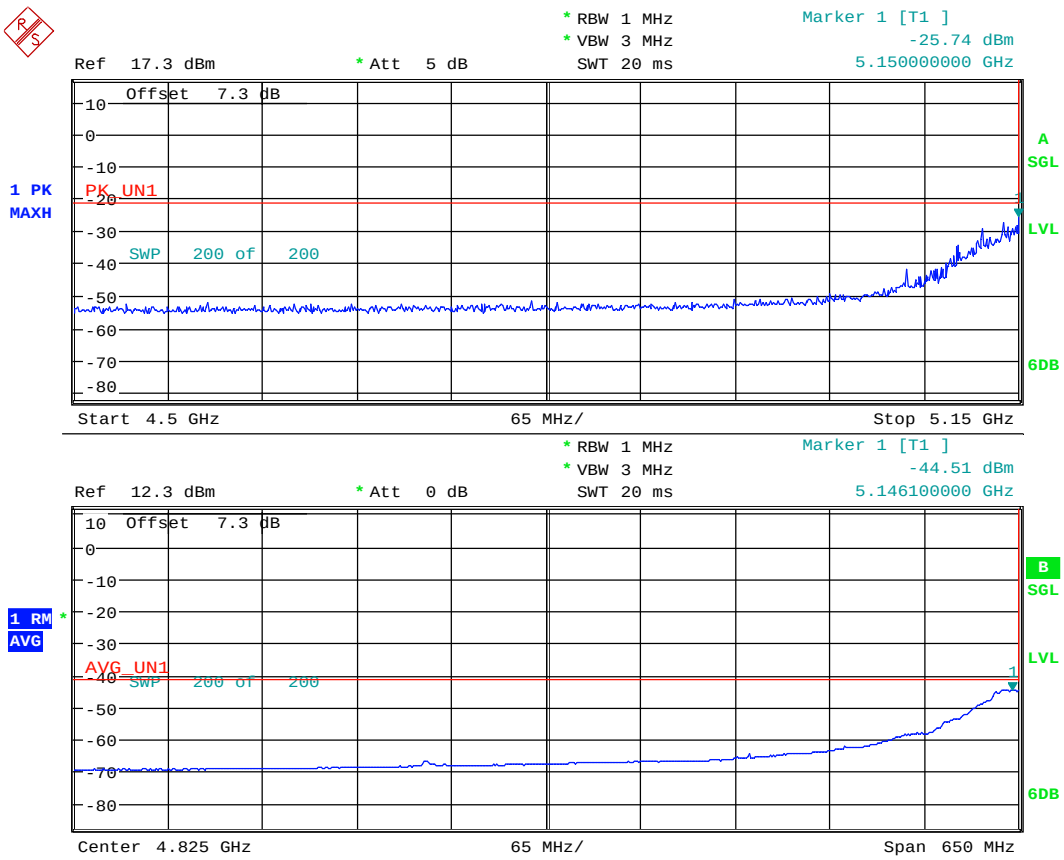
4500MHz – 5150 MHz Restricted band-edge

Plot #	EUT operating mode	Channel #	Band Edge	Measured Peak/AVG Value (dBm)	EIRP (dBm)	Limit (dBm)	Result
15	802.11a	36	Lower Restricted	Peak: -25.74	Peak: -22.54	Peak: -21.23	Pass
				AVG: -44.51	AVG: -41.31	AVG: -41.23	
16	802.11n_HT20	36	Lower Restricted	Peak: -27.07	Peak: -23.87	Peak: -21.23	Pass
				AVG: -45.03	AVG: -41.83	AVG: -41.23	

8.4.6 Measurement Plots:

Plot # 15

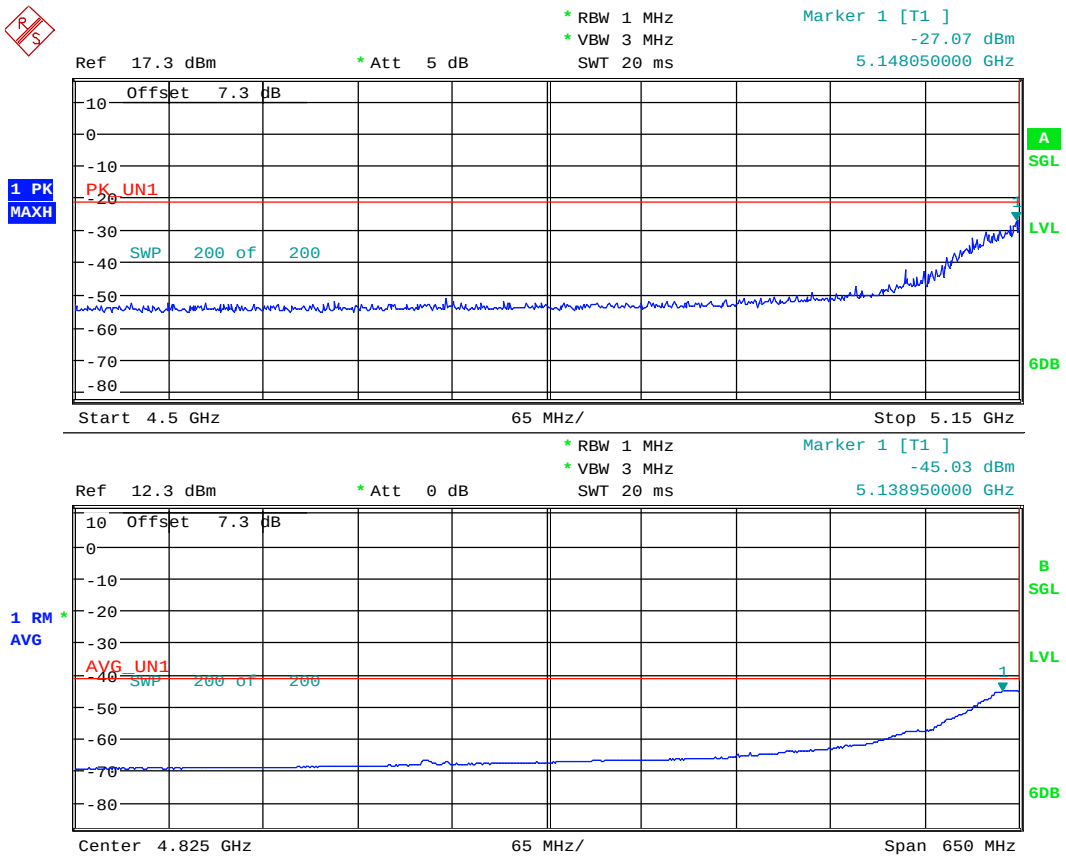
Channel: 36	Mode: 802.11a	TX Frequency: 5180 MHz



Date: 13.JAN.2021 11:35:06

Plot # 16

Channel: 36	Mode: 802.11n_HT20	TX Frequency: 5180 MHz



Date: 13.JAN.2021 11:37:52

8.5 Emission Bandwidth 26 dB, and 99%

8.5.1 Measurement according to FCC 789033 D02 General UNII Test Procedures New Rules v02r01

Spectrum Analyzer Settings for 26 dB EBW:

- Set RBW = approximately 1% of the emission bandwidth
- Set the VBW > RBW
- Detector = Peak
- Trace mode = Max Hold
- Sweep = Auto Couple
- Allow the trace to stabilize
- Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%

Spectrum Analyzer Settings for 99% Occupied Bandwidth

- Set center frequency to the nominal EUT channel center frequency
- Set span = 1.5 times to 5.0 times the OBW
- Set RBW = 1% to 5% of the OBW
- Set VBW ≥ 3 x RBW
- Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used
- Use the 99% power bandwidth function of the instrument (if available)

8.5.2 Limits:

FCC §15.247(e) and RSS-407 6.2.4.1

- For equipment operating in the band 5725-5850 MHz, the minimum 6 dB bandwidth shall be at least 500 kHz.

8.5.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input	Antenna Gain
23.8°C	1	Op.1	3.7 V DC	3.2 dBi

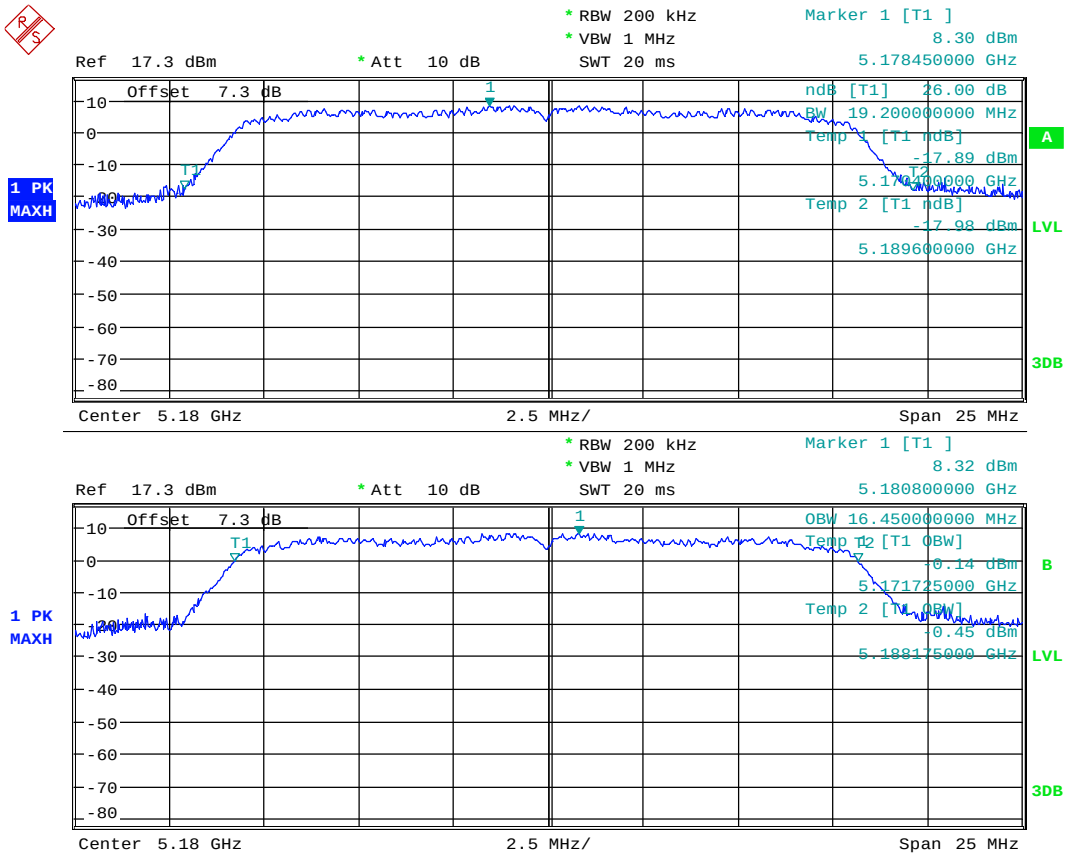
8.5.4 Measurement result:

802.11a					
Plot #	Channel #	26 dB Emissions Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
17	36	19.2	16.45	> 0.5	Pass
18	40	19.0	16.48	> 0.5	Pass
19	48	18.98	16.48	> 0.5	Pass

802.11n_HT20					
Plot #	Channel #	26 dB Emissions Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
20	36	19.2	17.53	> 0.5	Pass
21	40	19.4	17.53	> 0.5	Pass
22	48	19.2	17.5	> 0.5	Pass

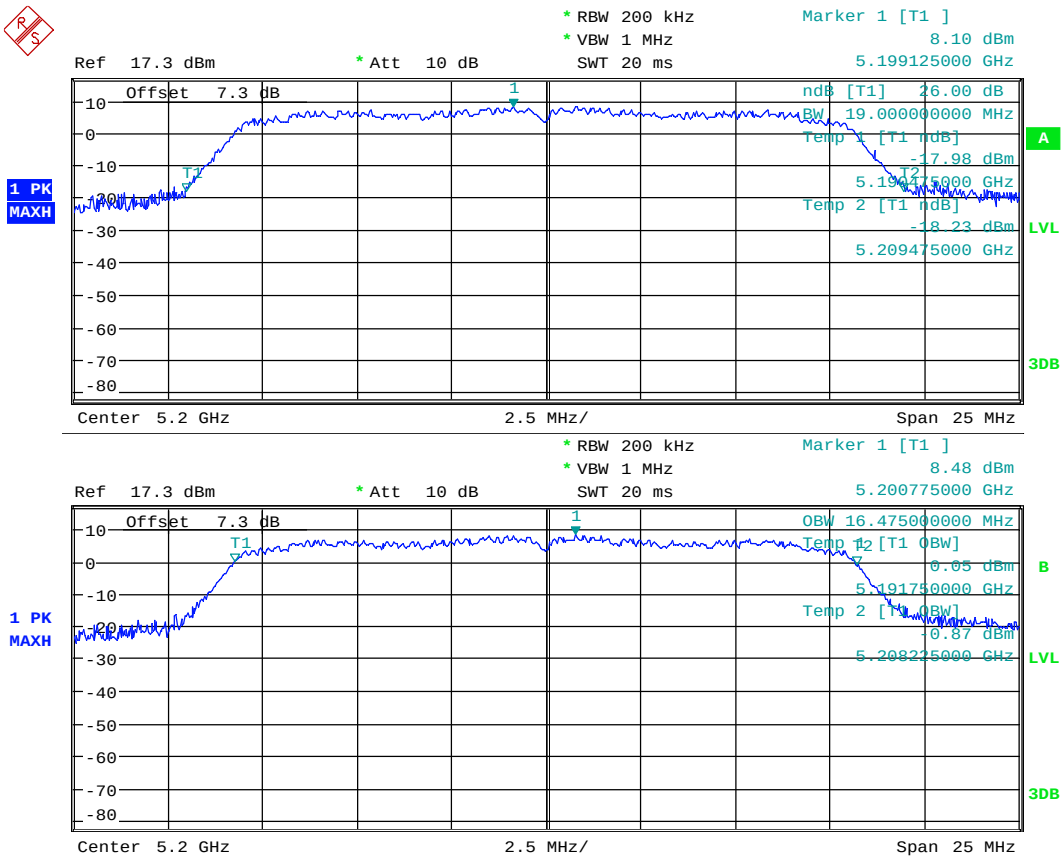
8.5.5 Measurement Plots:

Plot # 17		
Channel: 36	Mode: 802.11a	TX Frequency: 5180 MHz



Date: 13.JAN.2021 11:22:07

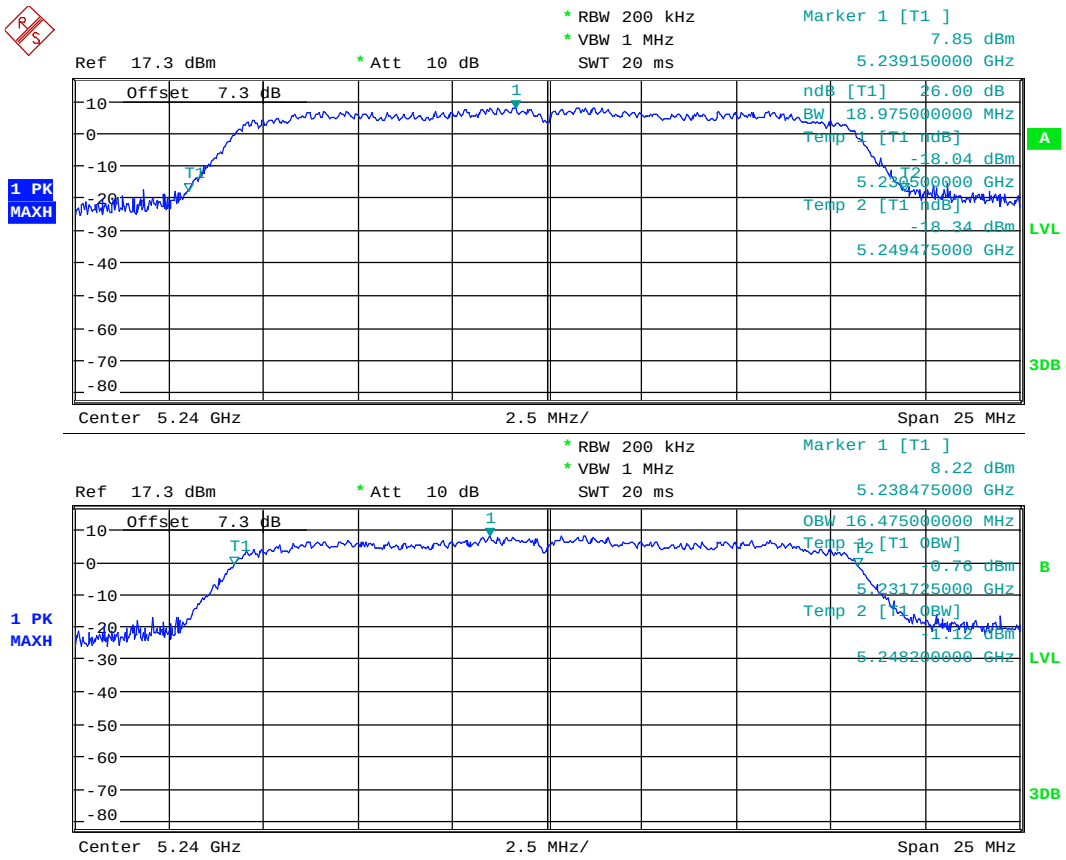
Plot # 18		
Channel: 40	**Mode: 802.11a**	**TX Frequency: 5200 MHz**



Date: 13.JAN.2021 11:15:36

Plot # 19

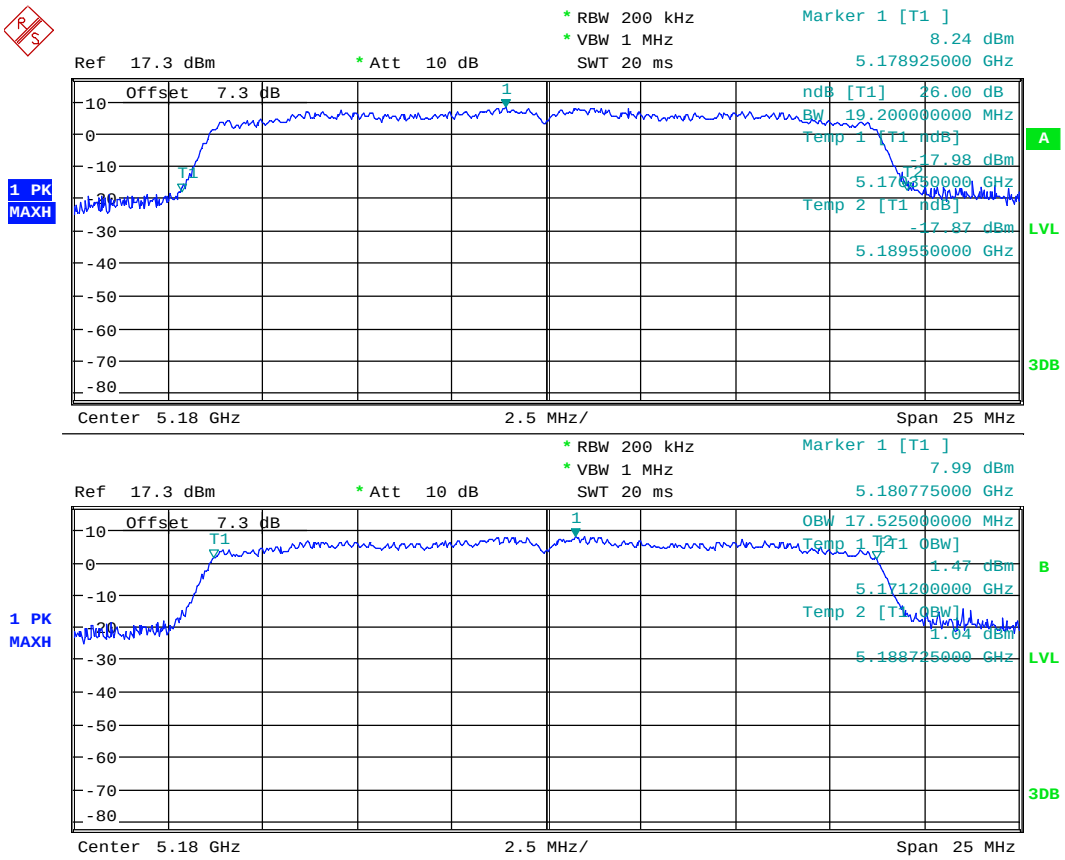
Channel: 48	Mode: 802.11a	TX Frequency: 5240 MHz



Date: 13.JAN.2021 11:13:06

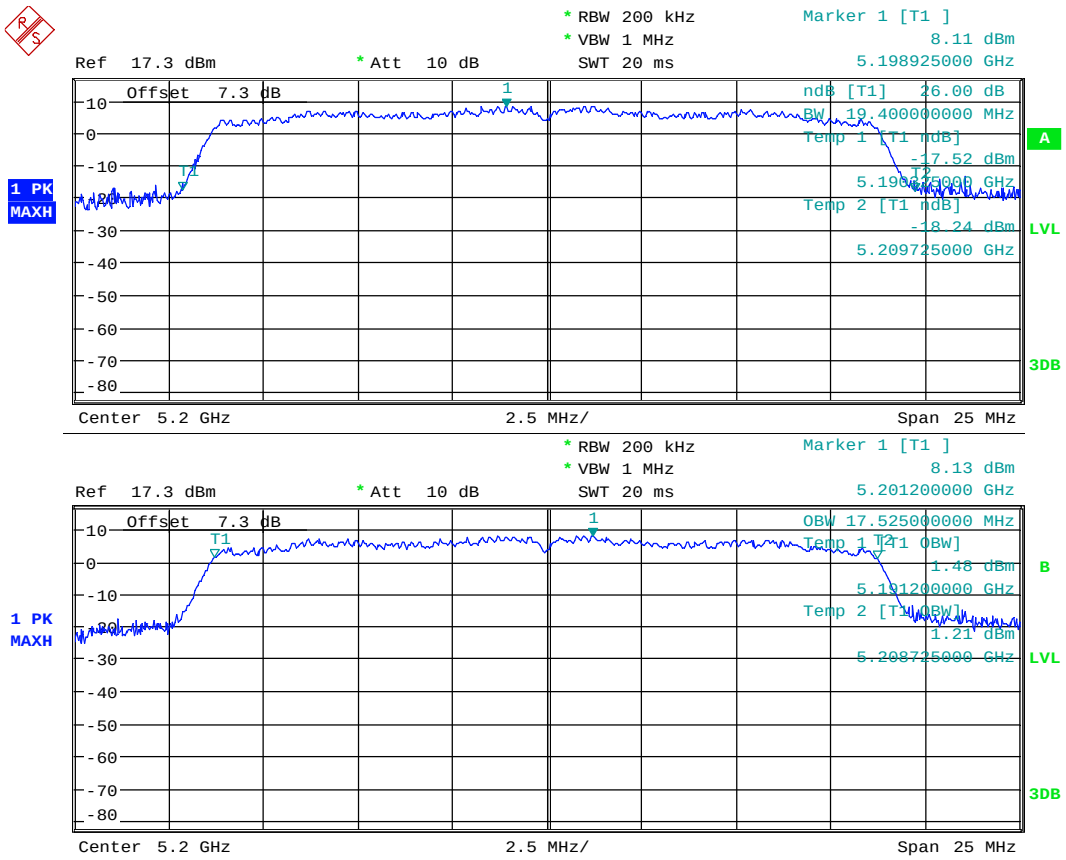
Plot # 20

Channel: 36	Mode: 802.11n_HT20	TX Frequency: 5180 MHz



Date: 13.JAN.2021 11:20:03

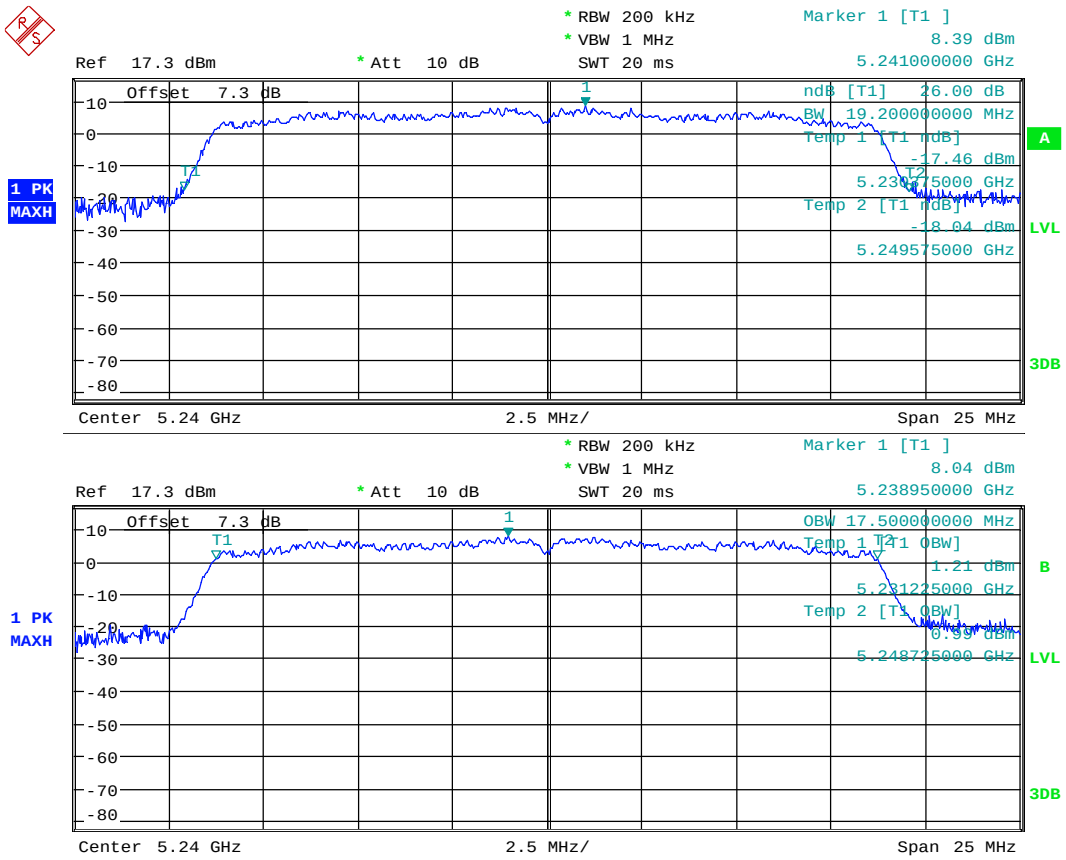
Plot # 21		
Channel: 40	**Mode: 802.11n_HT20**	**TX Frequency: 5200 MHz**



Date: 13.JAN.2021 11:17:38

Plot # 22

Channel: 48	Mode: 802.11n_HT20	TX Frequency: 5240 MHz



Date: 13.JAN.2021 11:09:07

8.6 Frequency Stability

8.6.1 Measurement according to:

- **FCC: CFR 47 Part 2.1055**

- **ANSI C63.10-2013 6.8**
  - **6.8.1 Frequency stability with respect to ambient temperature.**

a) Supply the EUT with a nominal ac voltage or install a new or fully charged battery in the EUT. If possible, a dummy load shall be connected to the EUT because an antenna near the metallic walls of an environmental test chamber could affect the output frequency of the EUT. If the EUT is equipped with a permanently attached, adjustable-length antenna, then the EUT shall be placed in the center of the chamber with the antenna adjusted to the shortest length possible. Turn ON the EUT and tune it to one of the number of frequencies shown in 5.6.

b) Couple the unlicensed wireless device output to the measuring instrument by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away), or by connecting a dummy load to the measuring instrument, through an attenuator if necessary.

NOTE – An instrument that has an adequate level of accuracy as specified by the procuring or regulatory agency is the recommended measuring instrument.

c) Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument but is strong enough to allow measurement of the operating or fundamental frequency of the EUT).

d) Turn the EUT OFF and place it inside the environmental temperature chamber. For devices that have oscillator heaters, energize only the heater circuit.

e) Set the temperature control on the chamber to the highest specified in the regulatory requirements for the type of device and allow the oscillator heater and the chamber temperature to stabilize.

f) While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.

g) Measure the frequency at each of frequencies specified in 5.6.

h) Switch OFF the EUT but do not switch OFF the oscillator heater.

i) Lower the chamber temperature by not more than 10 °C, and allow the temperature inside the chamber to stabilize.

j) Repeat step f) through step i) down to the lowest specified temperature.

- Spectrum Analyzer settings:
  - RBW =200 kHz
  - VBW ≥ 1 MHz
  - Set span = 10 MHz
  - Sweep time = auto couple
  - Detector = Pk
  - Trace mode = MaxHold
  - Use N dB Down function to set the low and high frequency.

8.6.1.1 Test conditions and setup:

EUT Set-Up #	EUT operating mode	Power Input (VDC)
1	Op. 1	3.7 V DC

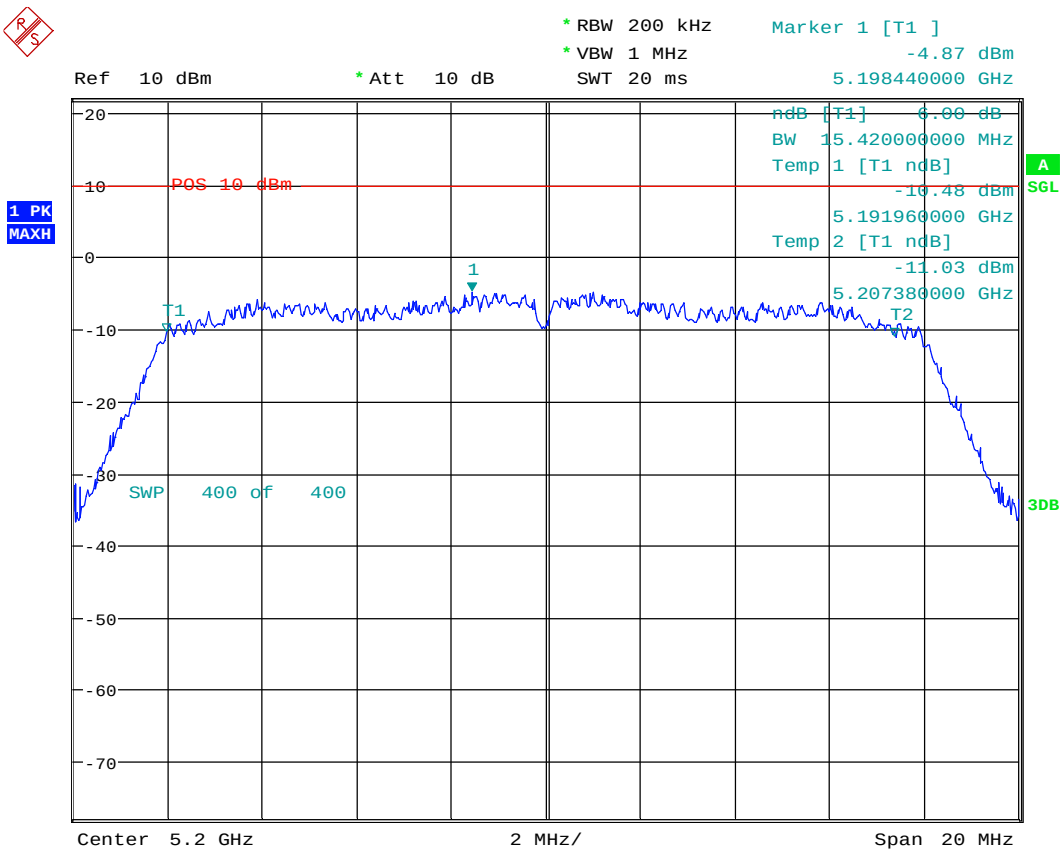
8.6.1.2 Measurement result:

*1 RCF: Reference Center Frequency.
*2 F low: Low frequency; -6 dB
*3 F high: High frequency; +6 dB
*4 CCF: Calculated Center Frequency; CCF = F low + (F high – F low)/2
*5 Variation = RCF - CCF
*6 PPM: [(CCF/RCF)-1] * 10^6

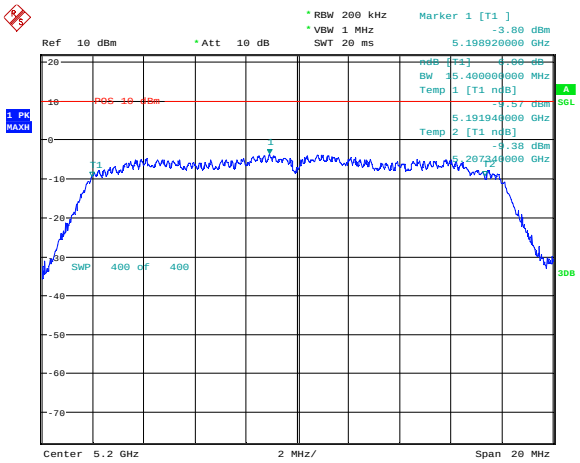
Plot #	Measurement Time (Minutes)	Temperature (°C)	RCF *1 (MHz)	F Low *2 (MHz)	F High *3 (MHz)	CCF *4 (MHz)	Variation *5 [MHz]	PPM *6 (+-)100
23	-	23	-	5191.96	5207.38	5199.67	-	-
28	0	50	5199.67	5191.94	5207.34	5199.64	0.03	-5.77
29	2	50		5192.34	5207.34	5199.84	-0.17	32.69
30	5	50		5191.96	5207.56	5199.76	-0.09	17.31
31	10	50		5192.36	5207.34	5199.85	-0.18	34.62
32	0	40	5199.67	5191.96	5207.36	5199.66	0.01	-1.92
33	2	40		5191.96	5207.36	5199.66	0.01	-1.92
34	5	40		5192.12	5207.34	5199.73	-0.06	11.54
35	10	40		5191.96	5207.56	5199.76	-0.09	17.31
36	0	30	5199.67	5192.54	5207.36	5199.95	-0.28	53.85
37	2	30		5192.36	5207.34	5199.85	-0.18	34.62
38	5	30		5192.12	5207.36	5199.74	-0.07	13.46
39	10	30		5192.38	5207.34	5199.86	-0.19	36.54
40	0	10	5199.67	5191.98	5207.38	5199.68	-0.01	1.92
41	2	10		5192.38	5207.4	5199.89	-0.22	42.31
42	5	10		5192	5207.38	5199.69	-0.02	3.85
43	10	10		5192.38	5207.38	5199.88	-0.21	40.39
44	0	0	5199.67	5192.02	5207.42	5199.72	-0.05	9.62
45	2	0		5192	5207.38	5199.69	-0.02	3.85
46	5	0		5191.98	5207.42	5199.7	-0.03	5.77
47	10	0		5192.16	5207.42	5199.79	-0.12	23.08
48	0	-10	5199.67	5192.4	5207.4	5199.9	-0.23	44.23
49	2	-10		5192.02	5207.42	5199.72	-0.05	9.62
50	5	-10		5192	5207.4	5199.7	-0.03	5.77
51	10	-10		5192	5207.4	5199.7	-0.03	5.77
52	0	-20	5199.67	5192.4	5207.4	5199.9	-0.23	44.23
53	2	-20		5192.4	5207.6	5200	-0.33	63.47
54	5	-20		5192.02	5207.42	5199.72	-0.05	9.62
55	10	-20		5192	5207.42	5199.71	-0.04	7.69

8.6.1.3 Measurement plots:

Plot #23		
5200 MHz	Reference Measurement	Temperature: 23°C

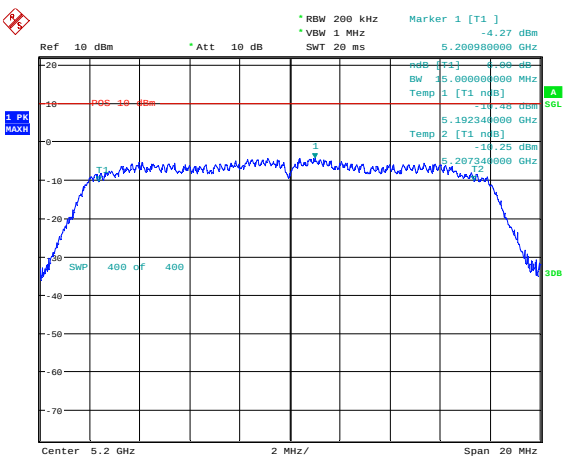


Plot #24		
5200 MHz	Measurement time: 0 min	Temperature: 50°C



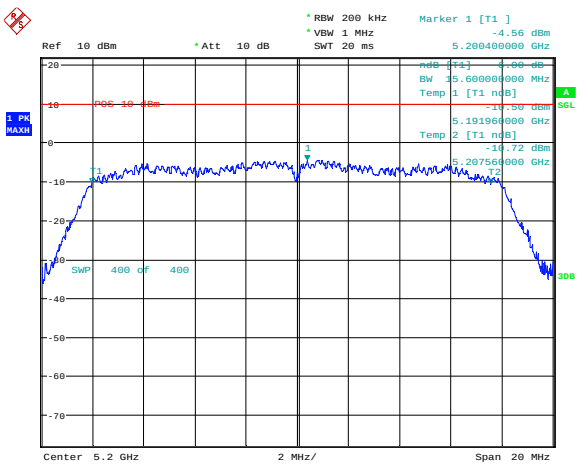
Date: 20.JAN.2021 16:52:36

Plot #25		
5200 MHz	Measurement time: 2 min	Temperature: 50°C



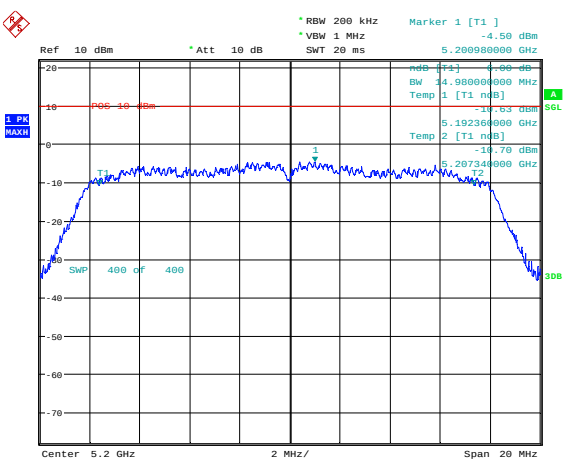
Date: 20.JAN.2021 16:55:05

Plot #26		
5200 MHz	Measurement time: 5 min	Temperature: 50°C



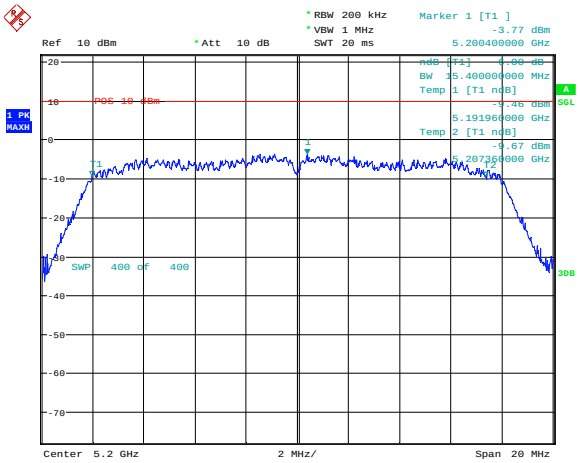
Date: 20.JAN.2021 17:00:32

Plot #27		
5200 MHz	Measurement time: 10 min	Temperature: 50°C



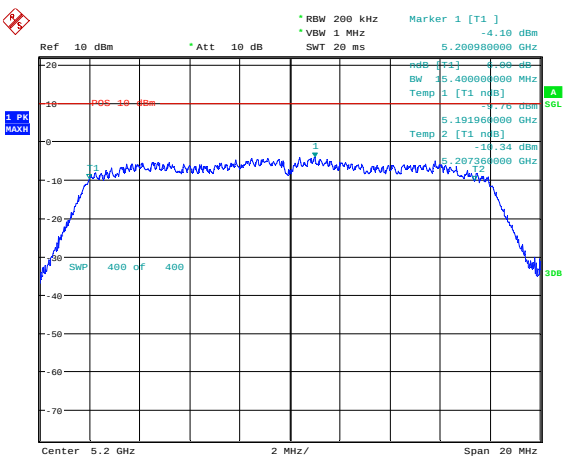
Date: 20.JAN.2021 17:11:15

Plot #28		
5200 MHz	Measurement time: 0 min	Temperature: 40°C



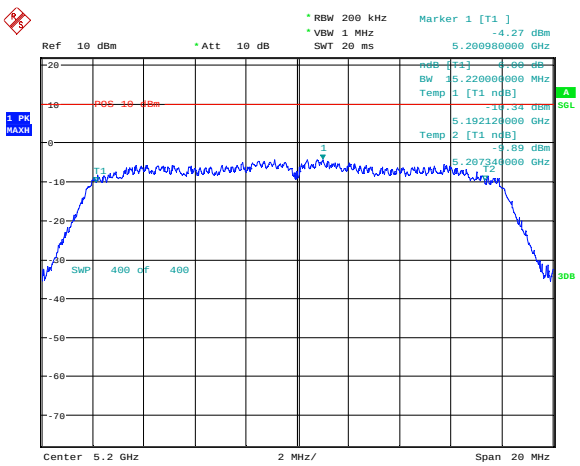
Date: 21.JAN.2021 11:34:32

Plot #29		
5200 MHz	Measurement time: 2 min	Temperature: 40°C



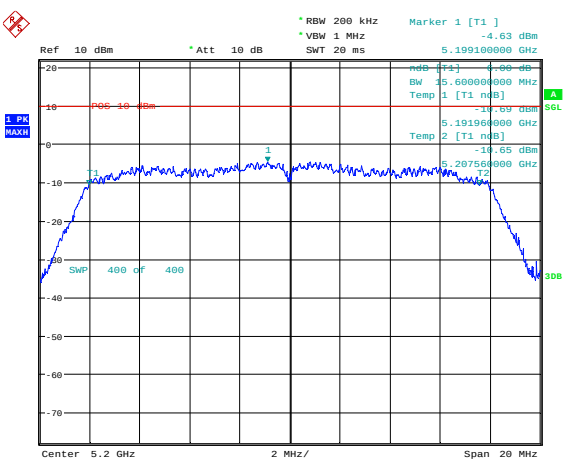
Date: 21.JAN.2021 11:36:36

Plot #30		
5200 MHz	Measurement time: 5 min	Temperature: 40°C



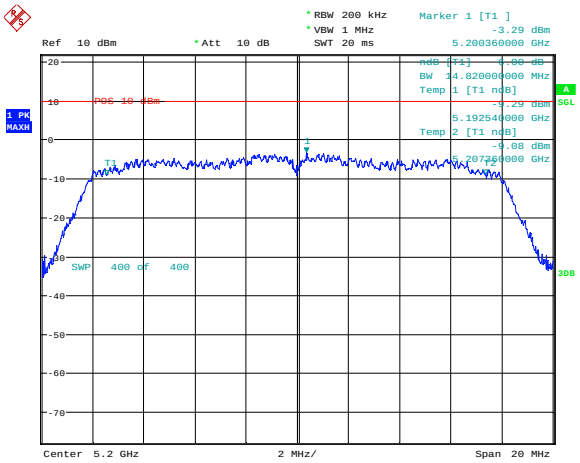
Date: 21.JAN.2021 11:42:47

Plot #31		
5200 MHz	Measurement time: 10 min	Temperature: 40°C



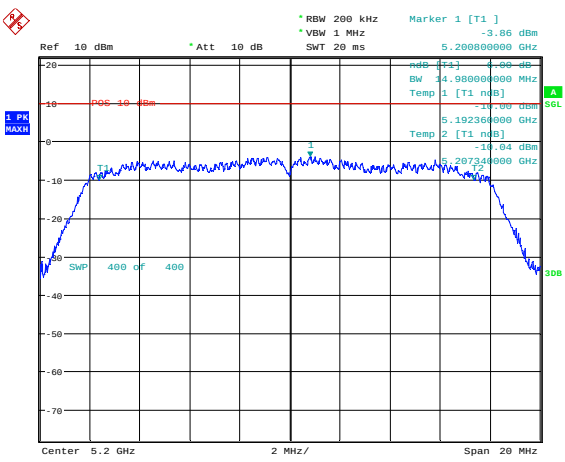
Date: 21.JAN.2021 11:52:54

Plot #32		
5200 MHz	Measurement time: 0 min	Temperature: 30°C



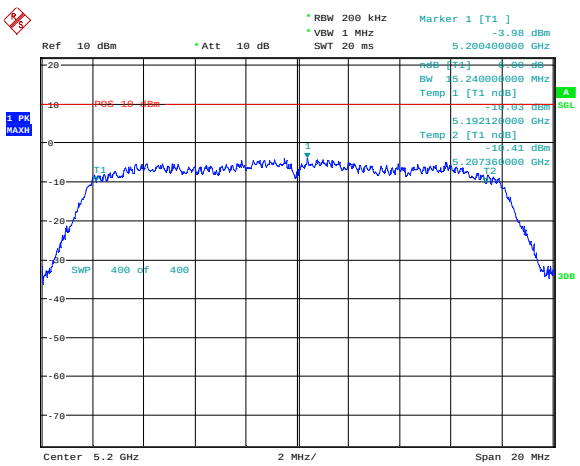
Date: 21.JAN.2021 13:01:31

Plot #33		
5200 MHz	Measurement time: 2 min	Temperature: 30°C



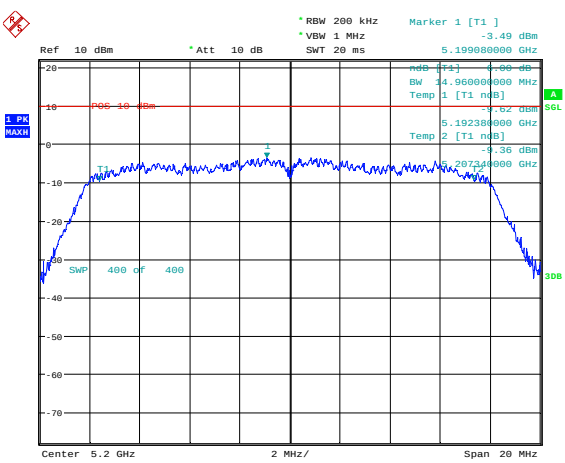
Date: 21.JAN.2021 13:03:39

Plot #34		
5200 MHz	Measurement time: 5 min	Temperature: 30°C



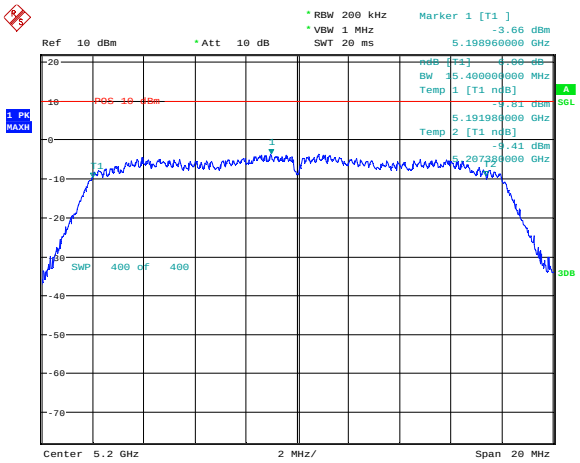
Date: 21.JAN.2021 13:08:58

Plot #35		
5200 MHz	Measurement time: 10 min	Temperature: 30°C



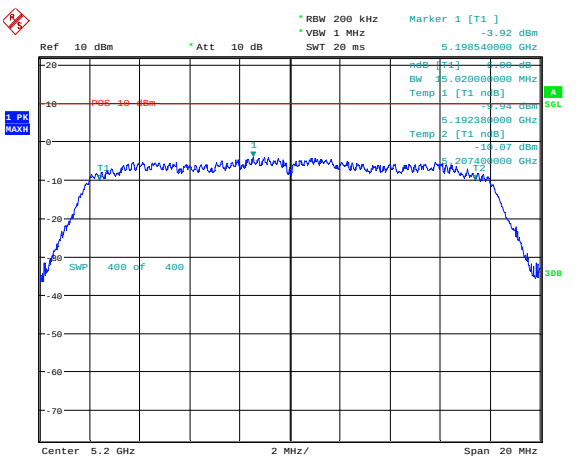
Date: 21.JAN.2021 13:20:38

Plot #36		
5200 MHz	Measurement time: 0 min	Temperature: 10°C



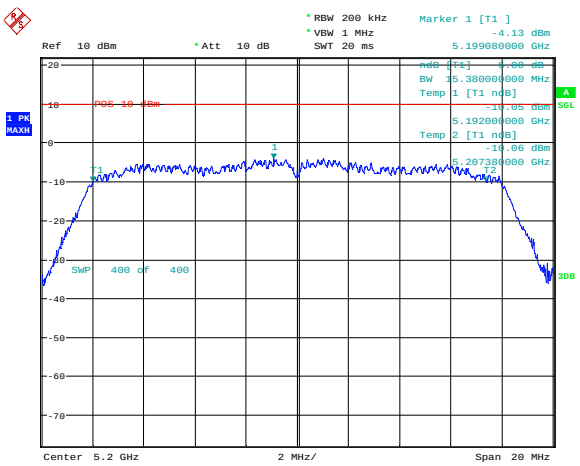
Date: 21.JAN.2021 15:45:37

Plot #37		
5200 MHz	Measurement time: 2 min	Temperature: 10°C



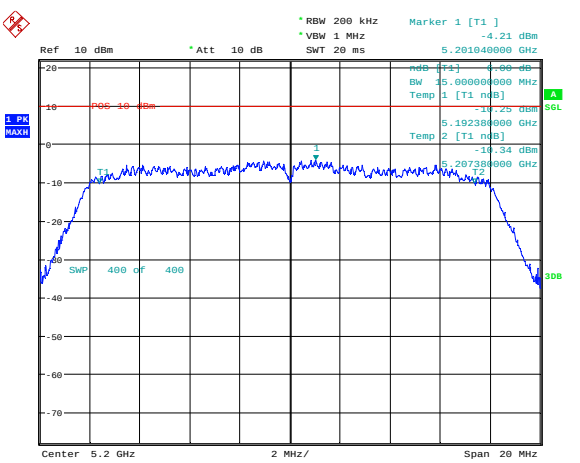
Date: 21.JAN.2021 15:47:56

Plot #38		
5200 MHz	Measurement time: 5 min	Temperature: 10°C



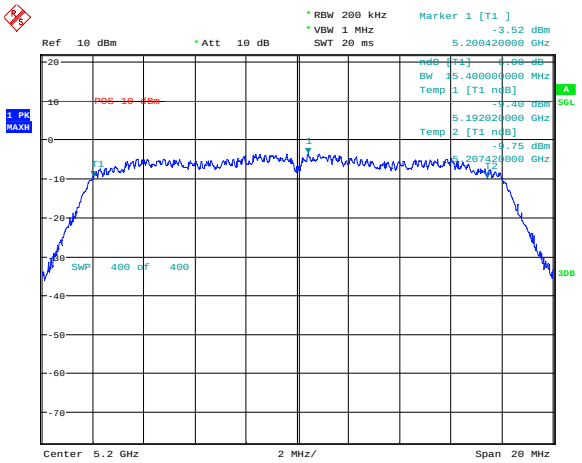
Date: 21.JAN.2021 15:53:29

Plot #39		
5200 MHz	Measurement time: 10 min	Temperature: 10°C



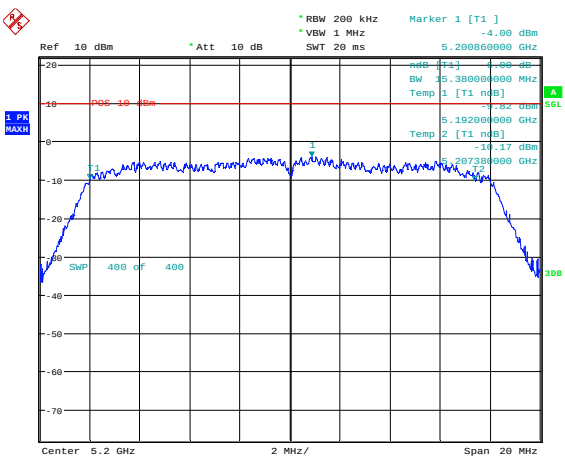
Date: 21.JAN.2021 16:03:39

Plot #40		
5200 MHz	Measurement time: 0 min	Temperature: 0°C



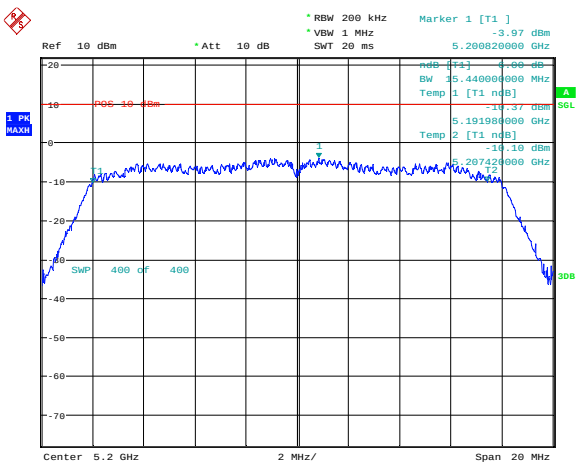
Date: 21.JAN.2021 17:21:02

Plot #41		
13.56 MHz	Measurement time: 2 min	Temperature: 0°C



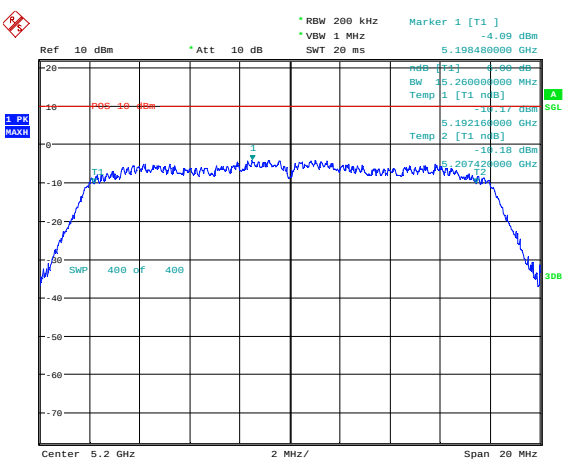
Date: 21.JAN.2021 17:23:17

Plot #42		
5200 MHz	Measurement time: 5 min	Temperature: 0°C



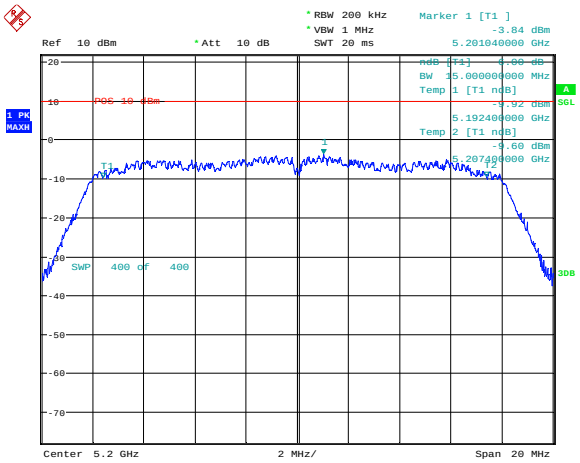
Date: 21.JAN.2021 17:28:30

Plot #43		
5200 MHz	Measurement time: 10 min	Temperature: 0°C

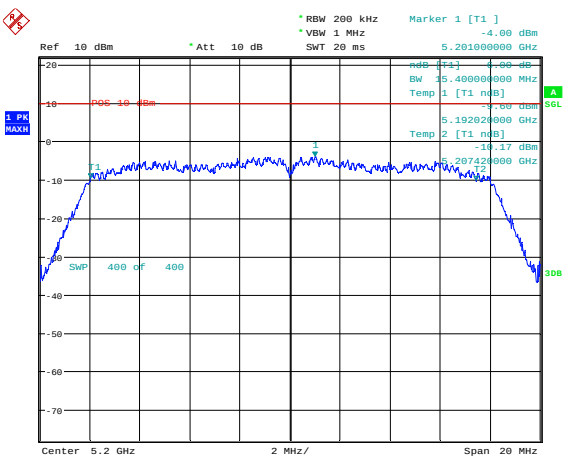


Date: 21.JAN.2021 17:38:46

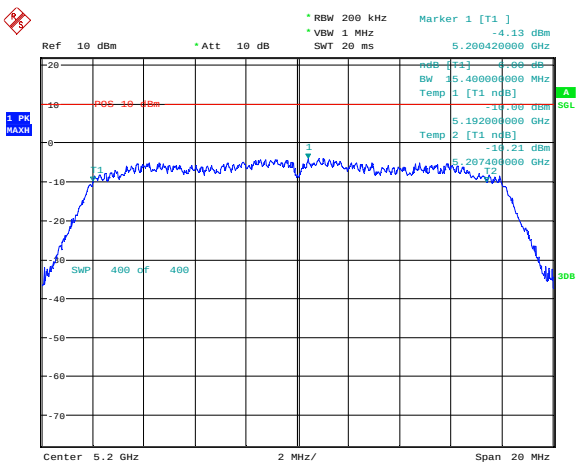
Plot #44		
5200 MHz	Measurement time: 0 min	Temperature: -10°C



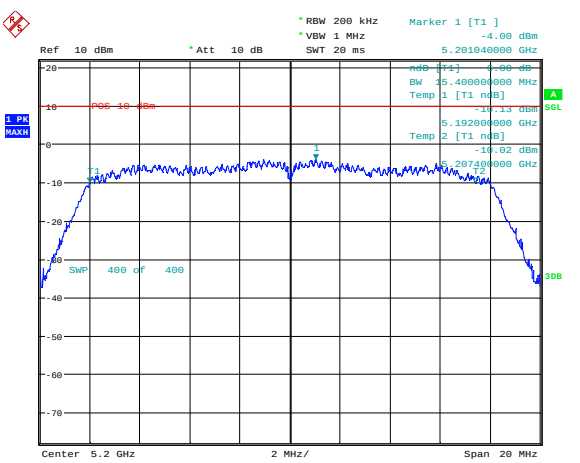
Plot #45		
13.56 MHz	Measurement time: 2 min	Temperature: -10°C



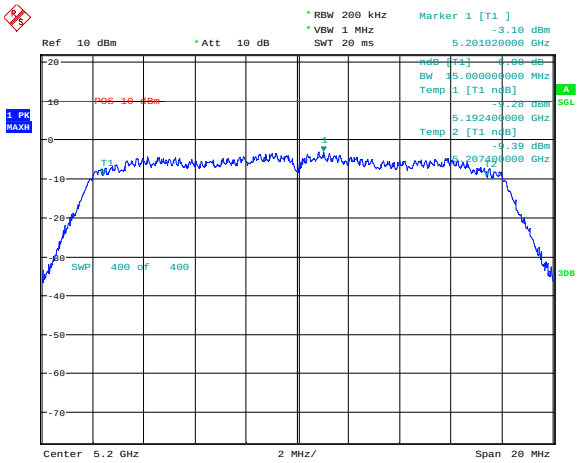
Plot #46		
5200 MHz	Measurement time: 5 min	Temperature: -10°C



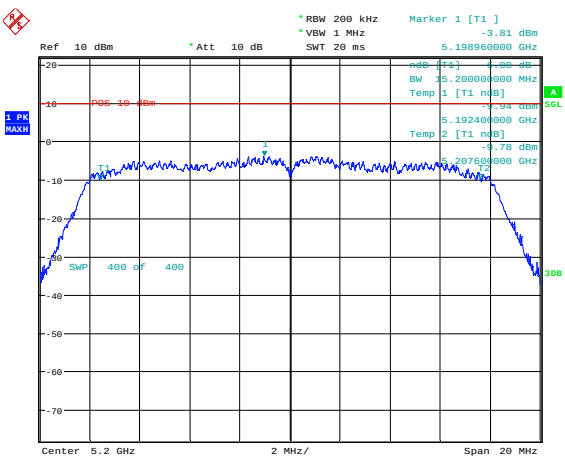
Plot #47		
5200 MHz	Measurement time: 10 min	Temperature: -10°C



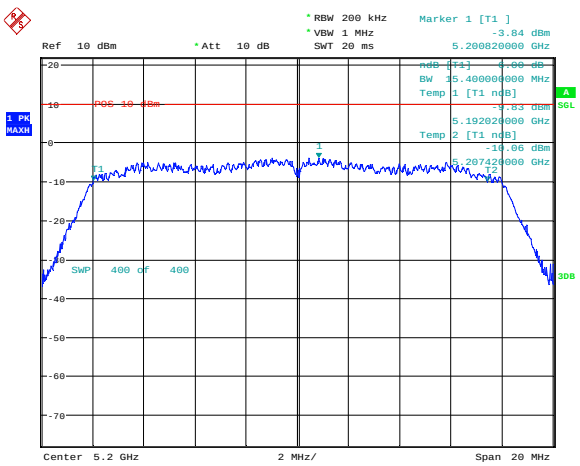
Plot #48		
5200 MHz	Measurement time: 0 min	Temperature: -20°C



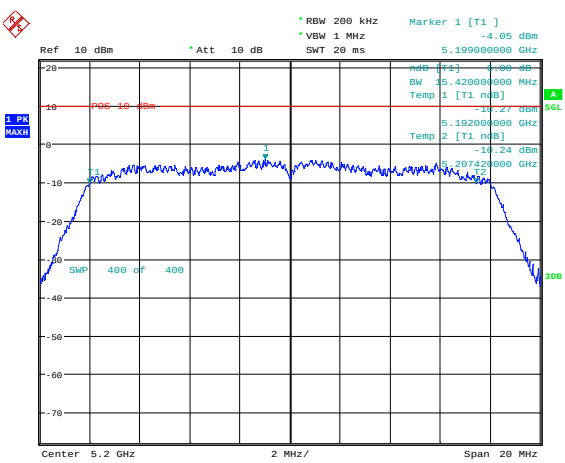
Plot #49		
13.56 MHz	Measurement time: 2 min	Temperature: -20°C



Plot #50		
5200 MHz	Measurement time: 5 min	Temperature: -20°C



Plot #51		
5200 MHz	Measurement time: 10 min	Temperature: -20°C



8.7 Radiated Transmitter Spurious Emissions

8.7.1 Measurement according to ANSI C63.10 (2013)

Spectrum Analyzer Settings:

- Frequency = 9 KHz – 30 MHz
- RBW = 9 KHz
- Detector: Peak

- Frequency = 30 MHz – 1 GHz
- Detector = Peak / Quasi-Peak
- RBW= 120 KHz (<1GHz)

- Frequency > 1 GHz
- Detector = Peak / Average
- RBW = 1 MHz

- Radiated spurious emissions shall be measured for the transmit frequencies, transmit power, and data rate for the lowest, middle and highest channel in each frequency band of operation and for the highest gain antenna for each antenna type, and using the appropriate parameters and test requirements.
- The highest (or worst-case) data rate shall be recorded for each measurement.
- For testing frequencies below 30 MHz at distance other than the specified in the standard, the limit conversion is calculated by using the FCC materials for the ANSI 63 committee issued on January, 27 1991.

8.7.2 Limits:

FCC §15.407

- Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.
- The provisions of §15.205 apply to intentional radiators operating under this section.

FCC §15.209

- Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency of emission (MHz)	Field strength (µV/m)	Measurement Distance (m)	Field strength @ 3m (dBµV/m)
0.009–0.490	2400/F(kHz) / ---------	300	-
0.490–1.705	24000/F(kHz) / --------	30	-
1.705–30.0	30 / (29.5)	30	-
30–88	100	3	40 dBµV/m
88–216	150	3	43.5 dBµV/m
216–960	200	3	46 dBµV/m
Above 960	500	3	54 dBµV/m

FCC §15.205

- Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

- Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
  *PEAK LIMIT= 74 dBµV/m
  *AVG. LIMIT= 54 dBµV/m

8.7.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input	Antenna Gain
23.8°C	2	Op.2	3.7 V DC	3.2 dBi

8.7.4 Measurement result:

Plot #	Channel #	Scan Frequency	Lowest margin emission [dBµV/m]	Limit	Result
60 – 62	Low (36)	30 MHz – 18 GHz	60.25	See section 8.7.2	Pass
63 – 67	Mid (40)	9 kHz – 40 GHz	46.45	See section 8.7.2	Pass
68 – 70	High (48)	30 MHz – 18 GHz	62.54	See section 8.7.2	Pass

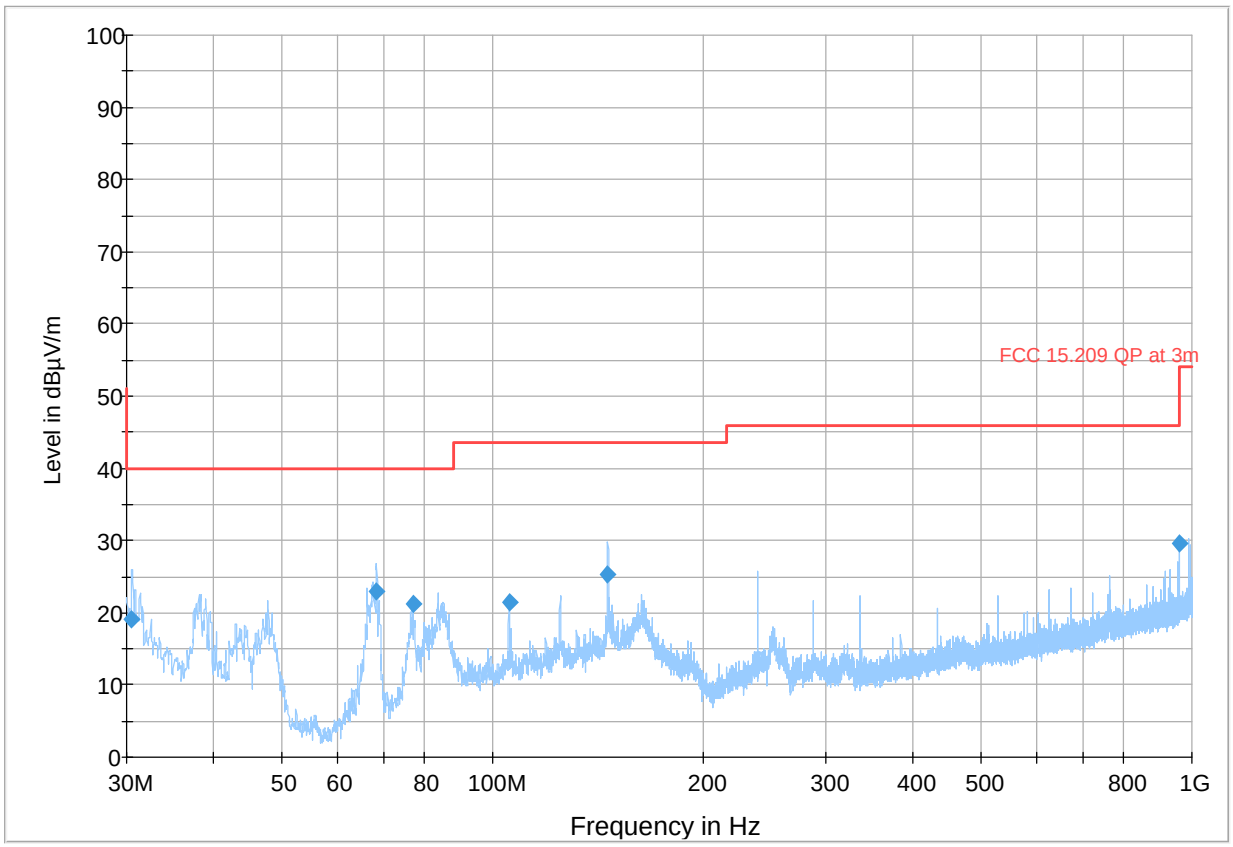
8.7.5 Measurement Plots:

Plot # 52 Radiated Emissions: 30 MHz – 1 GHz

Tx Frequency: 5180 MHz	Mode: 802.11a

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
105.660	21.37	43.50	22.13	500.0	120.000	100.0	V	245.0	-20.4
30.534	19.07	40.00	20.93	500.0	120.000	275.0	V	295.0	-17.6
77.191	21.18	40.00	18.82	500.0	120.000	100.0	V	126.0	-26.5
146.352	25.24	43.50	18.26	500.0	120.000	211.0	V	181.0	-17.7
68.315	22.91	40.00	17.09	500.0	120.000	244.0	V	178.0	-28.6
959.988	29.60	46.02	16.42	500.0	120.000	133.0	V	221.0	-9.0

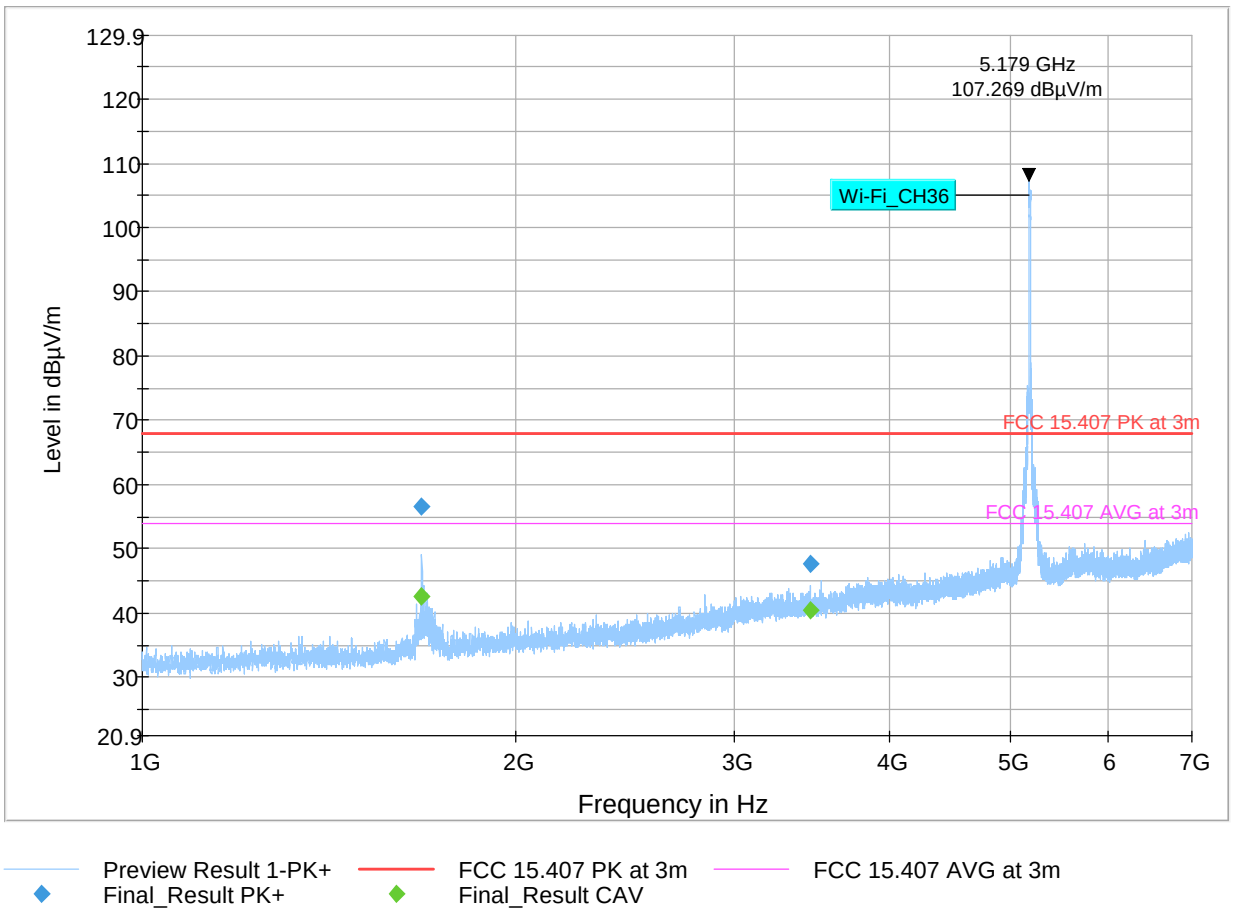


Plot # 53 Radiated Emissions: 1 – 7 GHz

Tx Frequency: 5180 MHz	Mode: 802.11a

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1680.000	---	42.70	53.98	11.27	500.0	1000.000	158.0	H	232.0	3.2
1680.000	56.60	---	68.00	11.40	500.0	1000.000	158.0	H	232.0	3.2
3453.250	---	40.35	53.98	13.63	500.0	1000.000	175.0	V	104.0	10.3
3453.250	47.65	---	68.00	20.35	500.0	1000.000	175.0	V	104.0	10.3

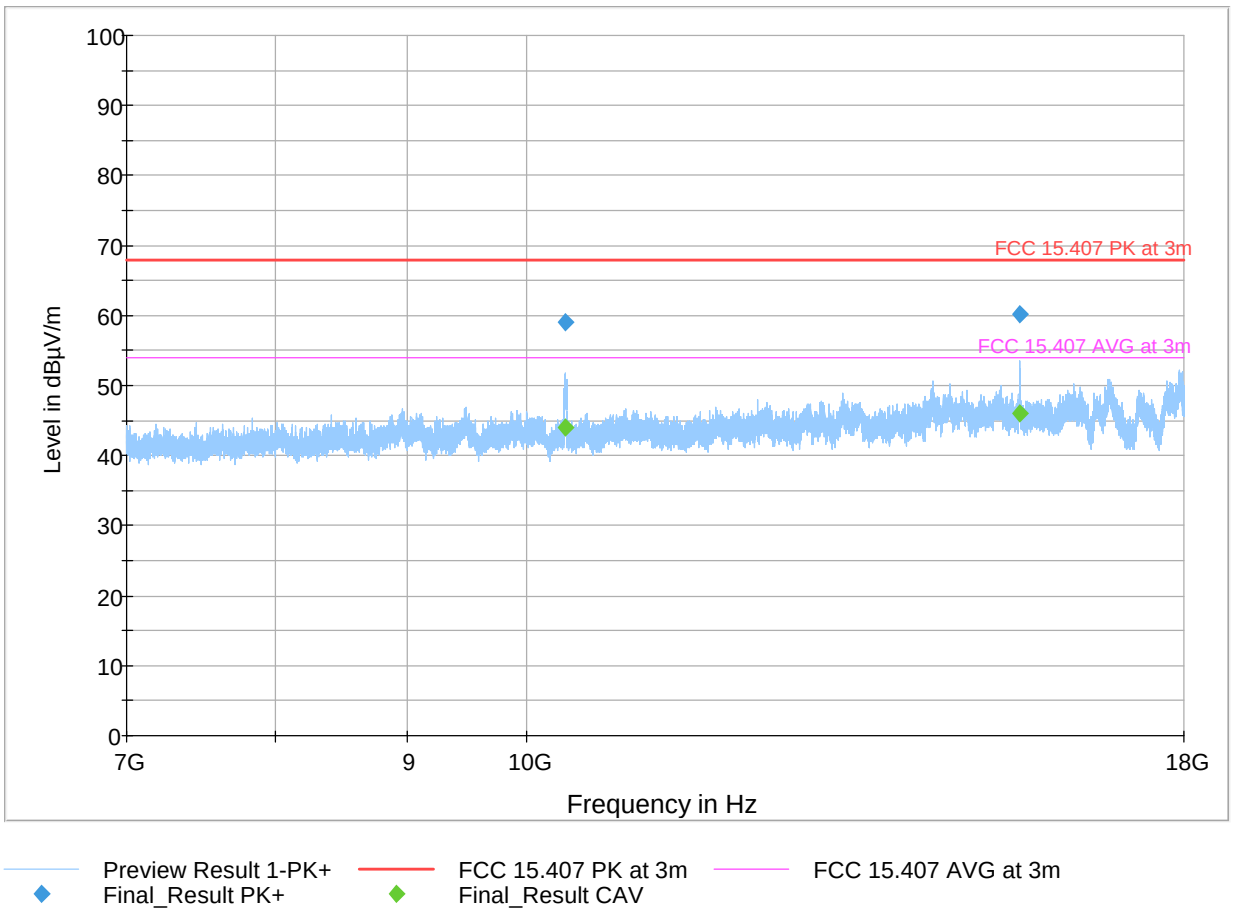


Plot # 54 Radiated Emissions: 7 – 18 GHz

Tx Frequency: 5180 MHz | **Mode: 802.11a**

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
10355.733	59.15	---	68.00	8.85	500.0	1000.000	229.0	H	338.0	3.1
10355.733	---	44.13	53.98	9.85	500.0	1000.000	229.0	H	338.0	3.1
15541.378	60.25	---	68.00	7.75	500.0	1000.000	116.0	H	6.0	10.2
15541.378	---	45.94	53.98	8.04	500.0	1000.000	116.0	H	6.0	10.2

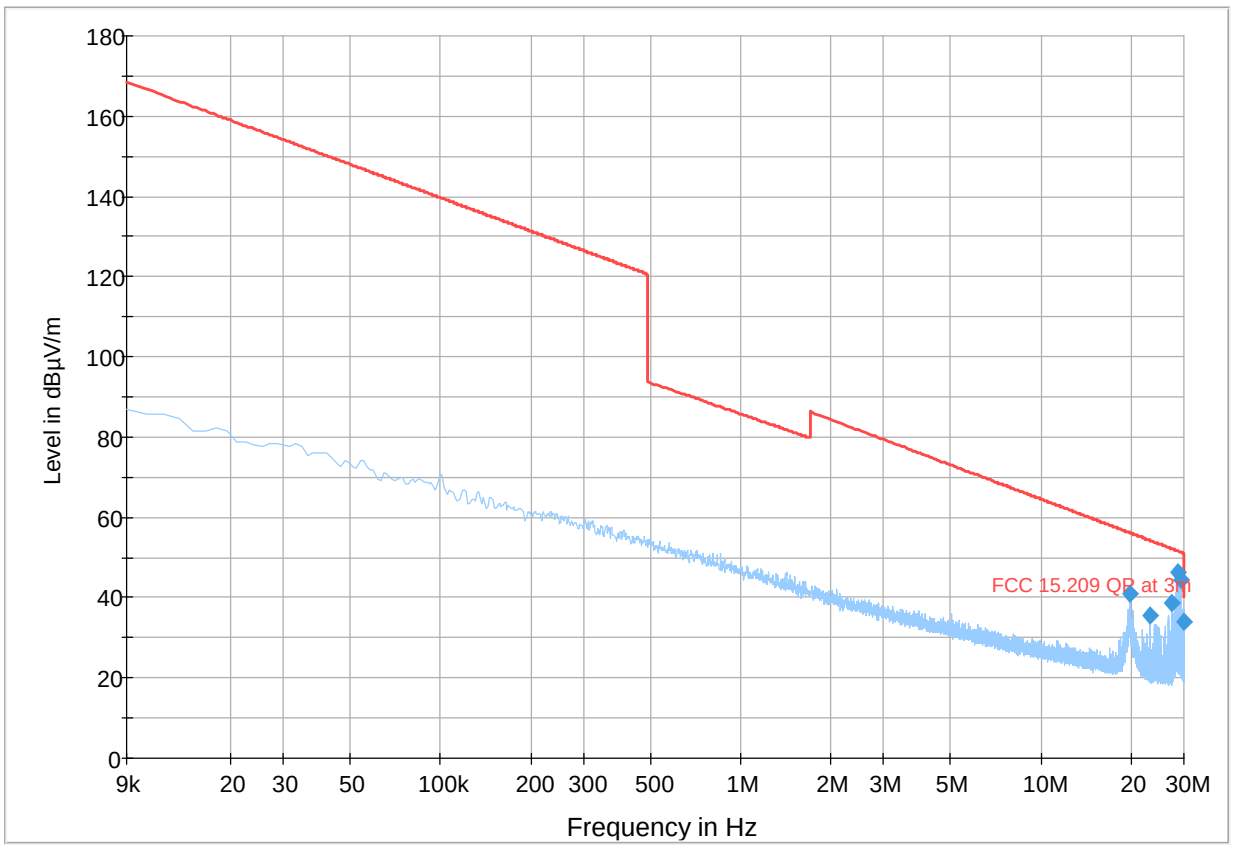


Plot # 55 Radiated Emissions: 9 KHz – 30 MHz

Tx Frequency: 5200 MHz | **Mode: 802.11a**

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
19.710	41.02	56.21	15.19	500.0	3.000	100.0	H	223.0	16.9
23.131	35.38	54.24	18.87	500.0	3.000	100.0	H	165.0	16.7
27.161	38.50	52.26	13.76	500.0	3.000	100.0	H	13.0	16.4
28.686	46.45	51.59	5.14	500.0	3.000	107.0	H	44.0	16.3
29.237	44.29	51.36	7.07	500.0	3.000	132.0	H	212.0	16.3
30.000	33.94	40.00	6.06	500.0	3.000	184.0	H	90.0	16.2

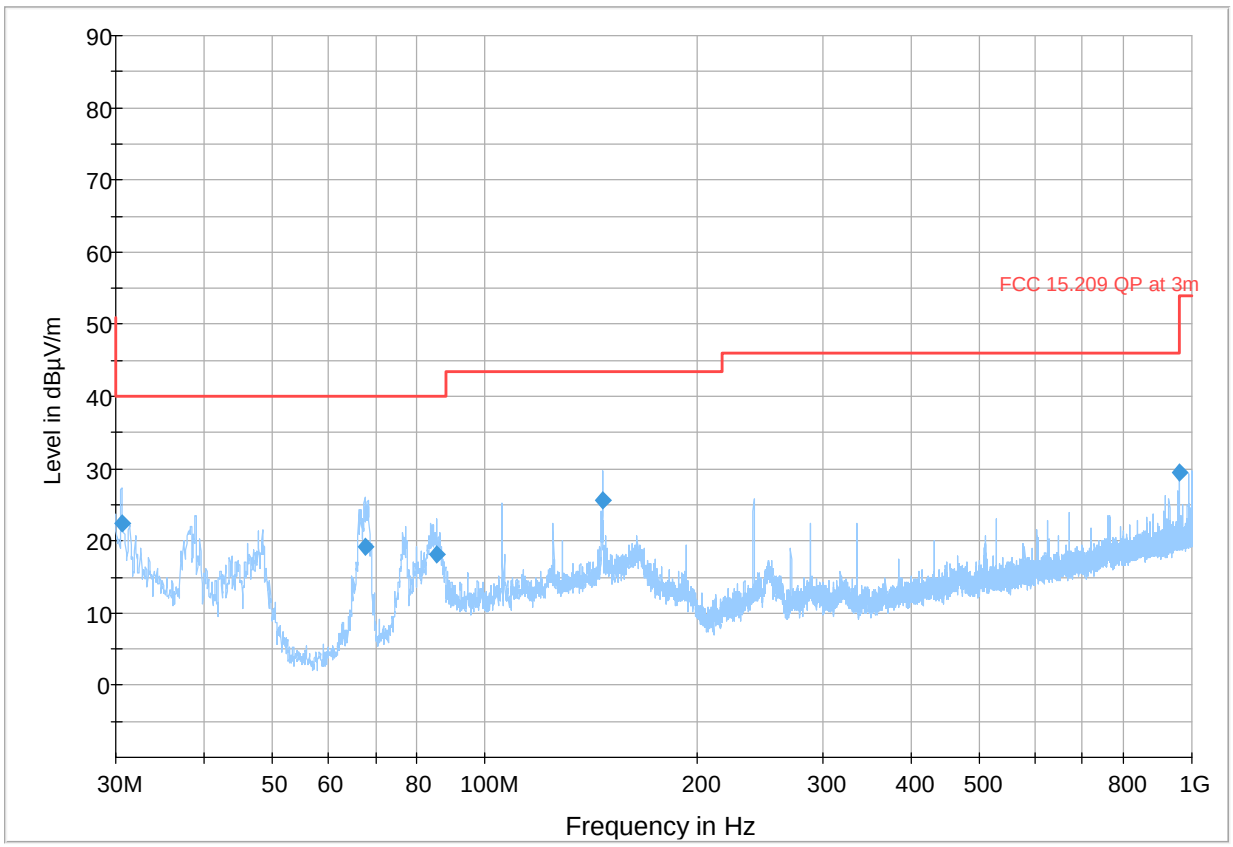


Plot # 56 Radiated Emissions: 30 MHz – 1 GHz

Tx Frequency: 5200 MHz | **Mode: 802.11a**

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.582	22.38	40.00	17.62	500.0	120.000	275.0	V	146.0	-17.7
67.539	19.28	40.00	20.72	500.0	120.000	270.0	V	282.0	-28.6
85.484	18.07	40.00	21.93	500.0	120.000	107.0	V	297.0	-24.6
146.352	25.66	43.50	17.84	500.0	120.000	125.0	V	85.0	-17.7
959.988	29.48	46.02	16.54	500.0	120.000	125.0	V	154.0	-9.0

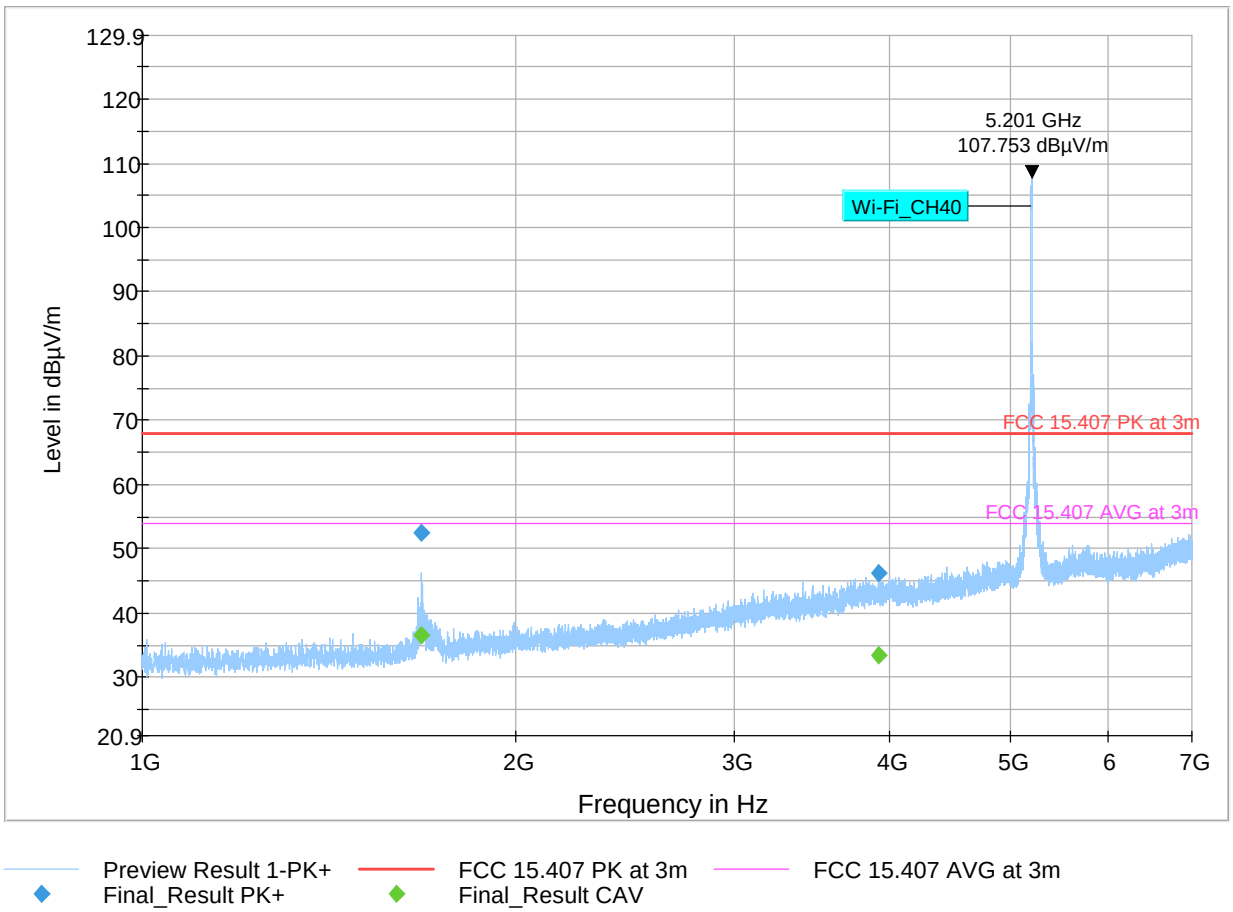


Plot # 57 Radiated Emissions: 1 – 7 GHz

Tx Frequency: 5200 MHz	Mode: 802.11a

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1679.500	---	36.66	53.98	17.32	500.0	1000.000	208.0	H	226.0	3.2
1679.500	52.53	---	68.00	15.47	500.0	1000.000	208.0	H	226.0	3.2
3912.000	---	33.35	53.98	20.63	500.0	1000.000	319.0	V	64.0	12.1
3912.000	46.17	---	68.00	21.83	500.0	1000.000	319.0	V	64.0	12.1

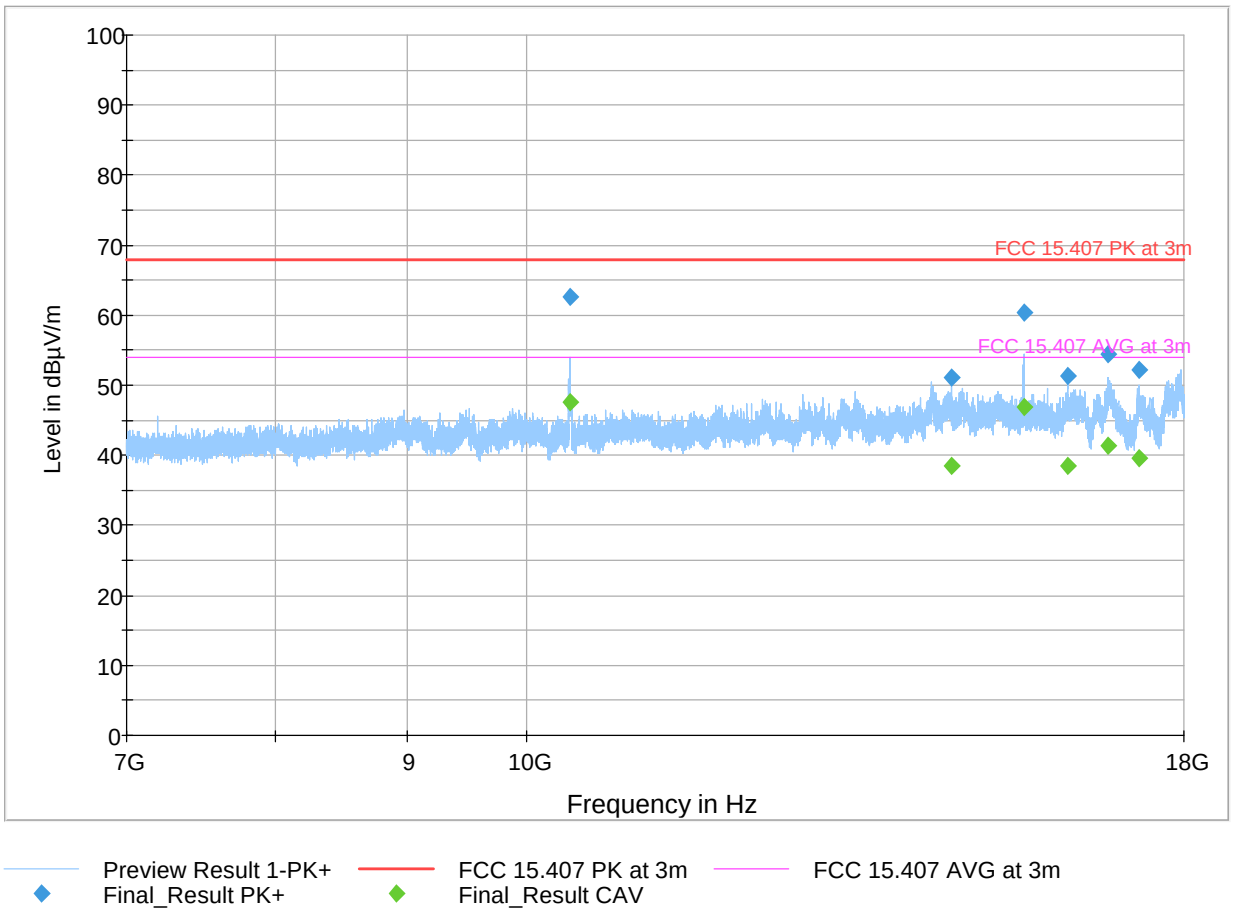


Plot # 58 Radiated Emissions: 7 – 18 GHz

Tx Frequency: 5200 MHz | **Mode: 802.11a**

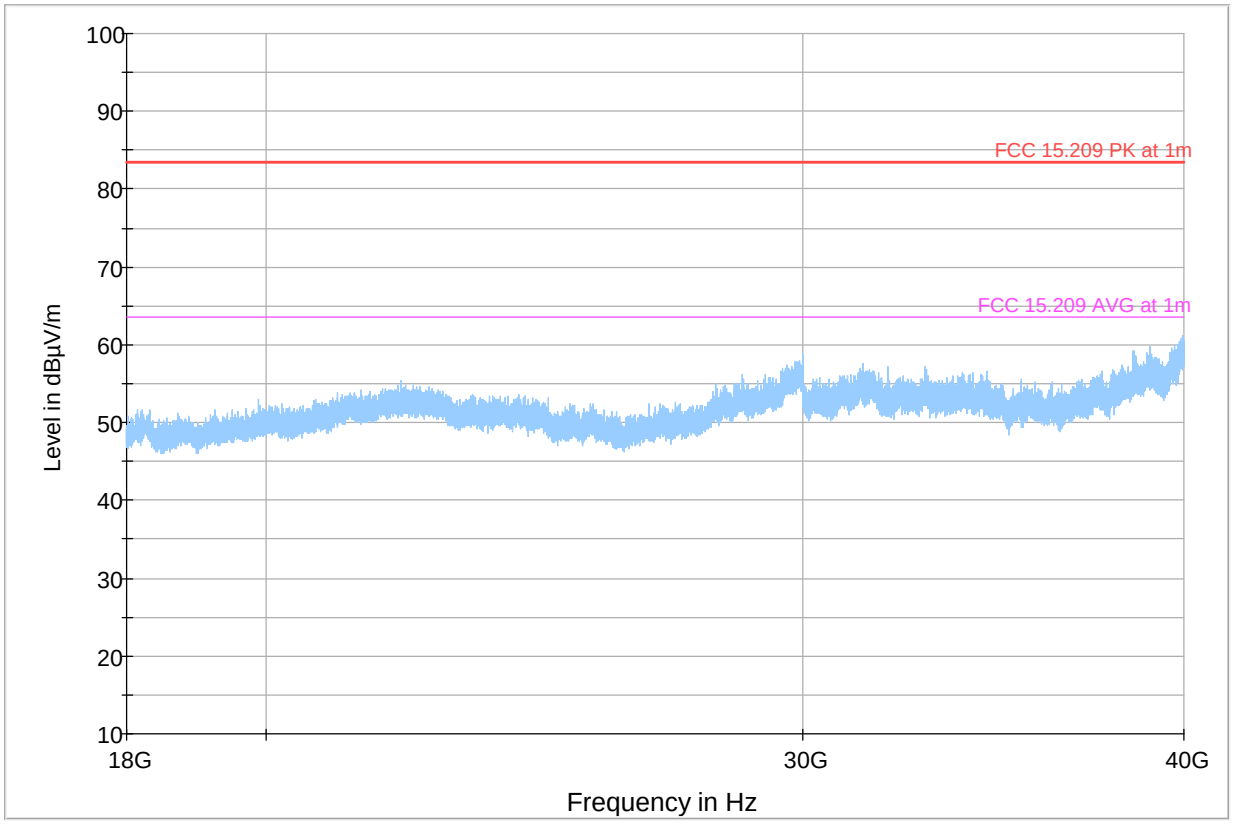
Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
10399.733	---	47.46	53.98	6.52	500.0	1000.000	271.0	V	-22.0	3.3
10399.733	62.60	---	68.00	5.40	500.0	1000.000	271.0	V	-22.0	3.3
14626.911	51.08	---	68.00	16.92	500.0	1000.000	221.0	V	194.0	8.8
14626.911	---	38.43	53.98	15.55	500.0	1000.000	221.0	V	194.0	8.8
15600.044	60.50	---	68.00	7.50	500.0	1000.000	100.0	H	5.0	10.1
15600.044	---	46.86	53.98	7.12	500.0	1000.000	100.0	H	5.0	10.1
16215.556	51.34	---	68.00	16.66	500.0	1000.000	100.0	H	255.0	13.2
16215.556	---	38.54	53.98	15.44	500.0	1000.000	100.0	H	255.0	13.2
16826.422	---	41.36	53.98	12.62	500.0	1000.000	133.0	V	-18.0	14.4
16826.422	54.32	---	68.00	13.68	500.0	1000.000	133.0	V	-18.0	14.4
17287.444	52.31	---	68.00	15.69	500.0	1000.000	228.0	H	90.0	15.2
17287.444	---	39.62	53.98	14.35	500.0	1000.000	228.0	H	90.0	15.2



Plot # 59 Radiated Emissions: 18 – 40 GHz

Tx Frequency: 5200 MHz	Mode: 802.11a

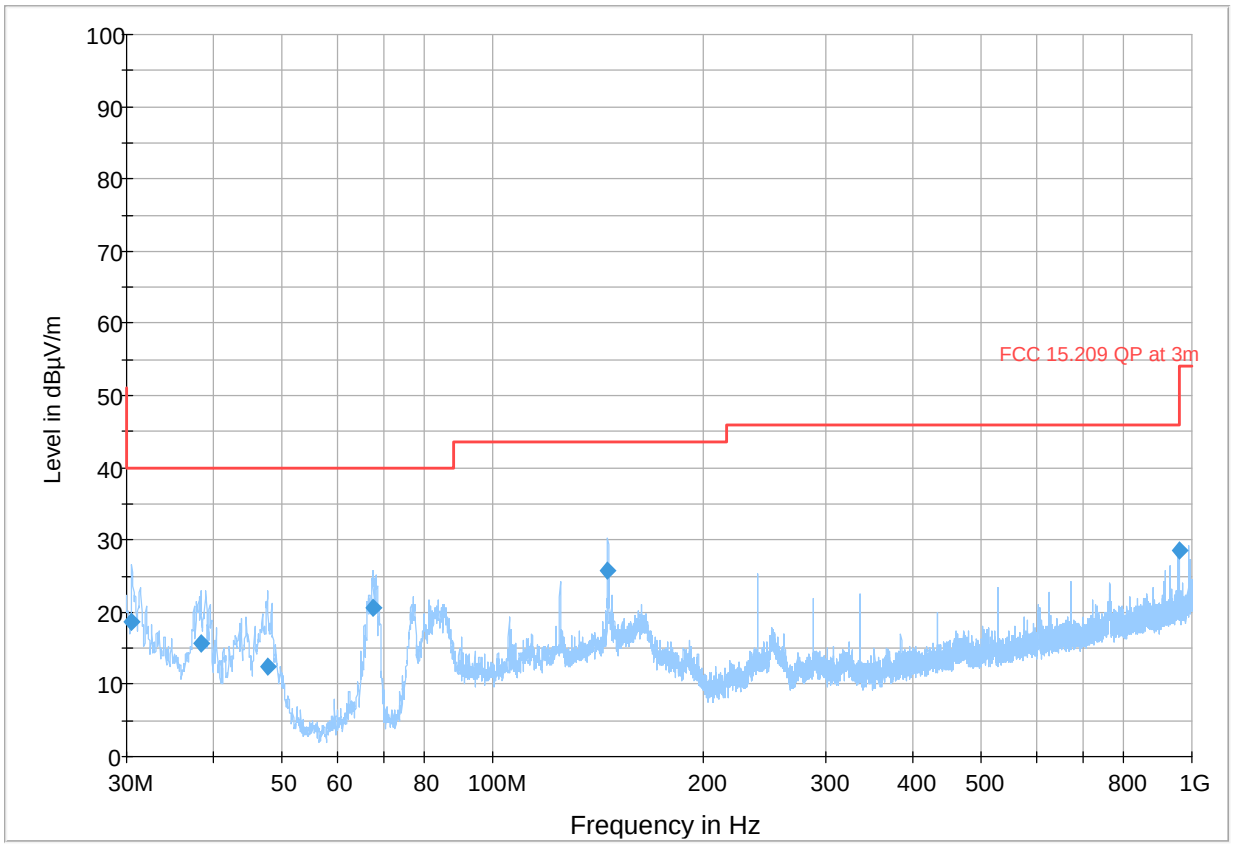


Plot # 60 Radiated Emissions: 30 MHz – 1 GHz

Tx Frequency: 5240 MHz | **Mode: 802.11a**

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.534	18.70	40.00	21.30	500.0	120.000	100.0	V	252.0	-17.6
38.294	15.69	40.00	24.31	500.0	120.000	100.0	V	193.0	-21.5
47.703	12.54	40.00	27.46	500.0	120.000	134.0	V	-25.0	-25.4
67.539	20.70	40.00	19.30	500.0	120.000	275.0	V	232.0	-28.6
146.352	25.71	43.50	17.79	500.0	120.000	141.0	V	212.0	-17.7
959.988	28.59	46.02	17.43	500.0	120.000	124.0	V	87.0	-9.0

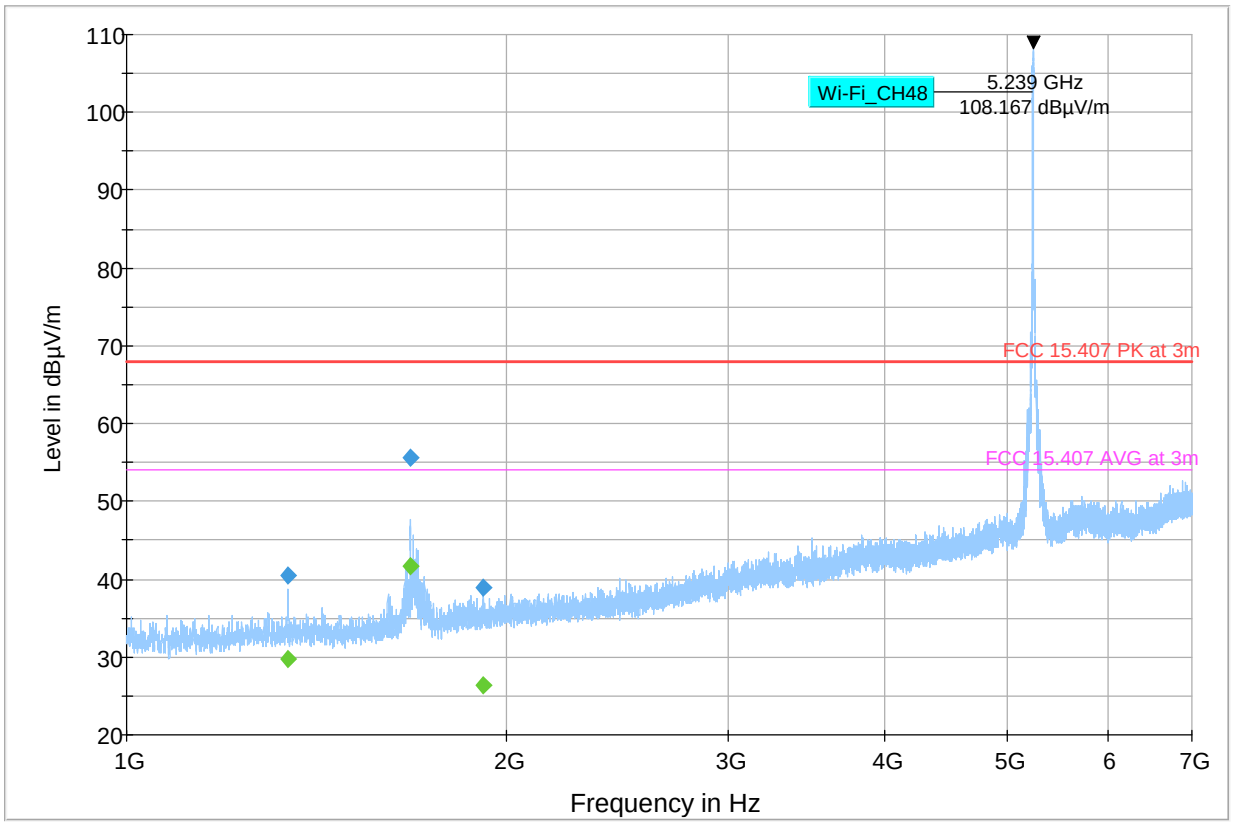


Plot # 61 Radiated Emissions: 1 – 7 GHz

Tx Frequency: 5240 MHz	Mode: 802.11a

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1343.750	---	29.77	53.98	24.21	500.0	1000.000	125.0	V	58.0	1.8
1343.750	40.57	---	68.00	27.43	500.0	1000.000	125.0	V	58.0	1.8
1680.250	55.62	---	68.00	12.38	500.0	1000.000	210.0	H	232.0	3.2
1680.250	---	41.75	53.98	12.23	500.0	1000.000	210.0	H	232.0	3.2
1920.750	38.96	---	68.00	29.04	500.0	1000.000	142.0	V	2.0	3.9
1920.750	---	26.34	53.98	27.64	500.0	1000.000	142.0	V	2.0	3.9

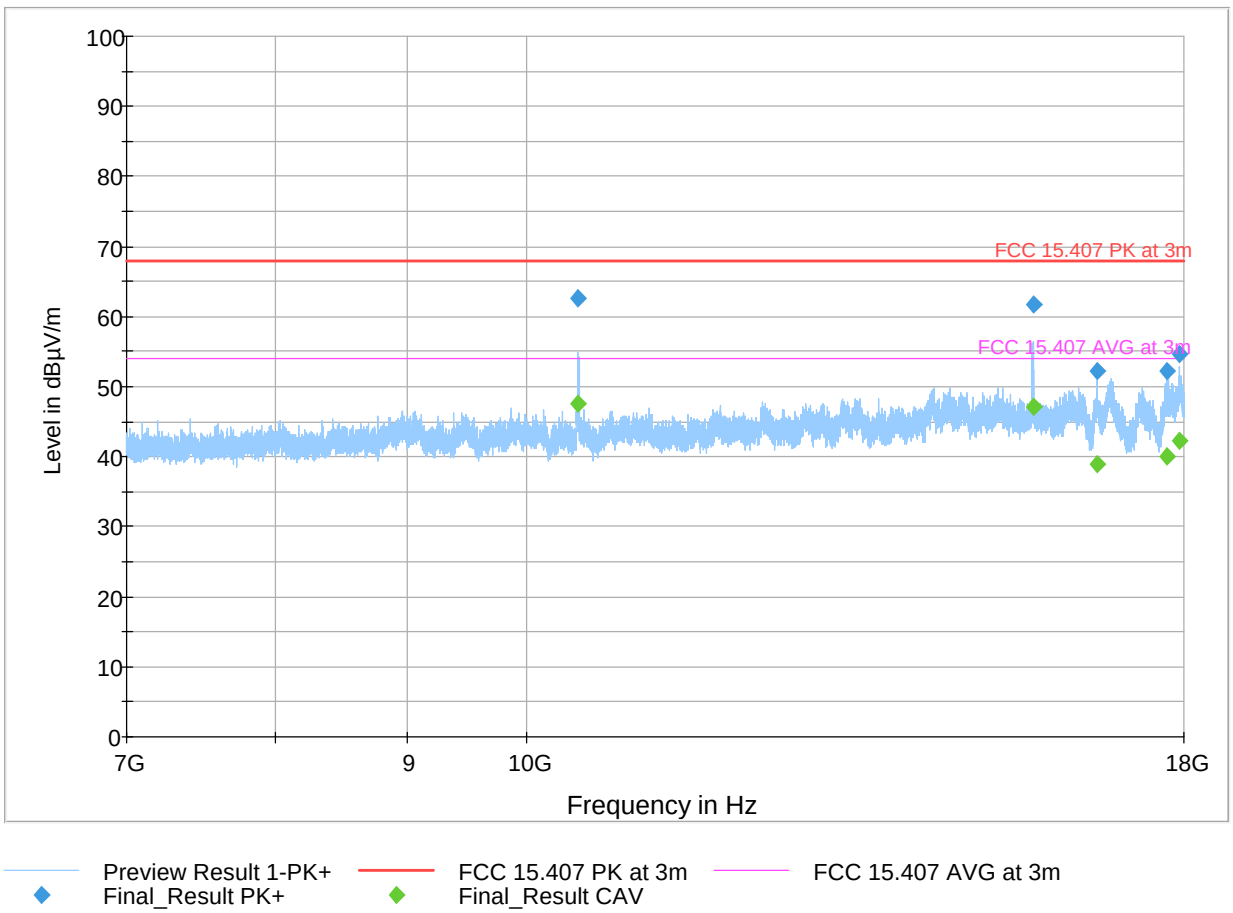


Plot # 62 Radiated Emissions: 7 – 18 GHz

Tx Frequency: 5240 MHz | **Mode: 802.11a**

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
10479.667	62.54	---	68.00	5.46	500.0	1000.000	125.0	V	178.0	3.3
10479.667	---	47.47	53.98	6.51	500.0	1000.000	125.0	V	178.0	3.3
15728.378	---	47.21	53.98	6.77	500.0	1000.000	100.0	H	202.0	10.9
15728.378	61.68	---	68.00	6.32	500.0	1000.000	100.0	H	202.0	10.9
16658.733	---	38.86	53.98	15.12	500.0	1000.000	233.0	H	-45.0	12.5
16658.733	52.14	---	68.00	15.86	500.0	1000.000	233.0	H	-45.0	12.5
17716.689	---	39.96	53.98	14.02	500.0	1000.000	272.0	V	32.0	15.7
17716.689	52.29	---	68.00	15.71	500.0	1000.000	272.0	V	32.0	15.7
17932.533	54.74	---	68.00	13.26	500.0	1000.000	168.0	H	159.0	17.7
17932.533	---	42.27	53.98	11.71	500.0	1000.000	168.0	H	159.0	17.7



9 Test setup photos

Setup photos are included in supporting file name: "EMC_AXONN_012_20001_FCC_Setup_Photos.pdf"

10 Test Equipment And Ancillaries Used For Testing

Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
ACTIVE LOOP ANTENNA	ETS LINDGREN	6507	00161344	3 YEARS	10/30/2020
BILOG ANTENNA	A.H. Systems	BiLA2G	569	3 YEARS	12/1/2020
HORN ANTENNA	EMCO	3115	00035111	3 YEARS	4/17/2019
HORN ANTENNA	ETS LINDGREN	3117-PA	00169547	3 YEARS	9/1/2020
HORN ANTENNA	ETS LINDGREN	3116C	00169535	3 YEARS	9/23/2020
ESW.EMI TEST RECEIVER	R&S	ESW44	101715	3 YEARS	1/6/2020
Spectrum Analyzer	R&S	FSU26	200065	3 YEARS	7/16/2019
Digital Thermometer/Chilled Mirror Hygrometer	Control Company	36934-164	191872028	3 years	1/10/2019

Note: Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels. Calibration due dates, unless defined specifically, falls on the last day of the month. Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use.

11 History

Date	Report Name	Changes to report	Report prepared by	Reviewed by
4/8/2021	EMC_AXONN_012_20001_FCC_15.407_WIFI_UNII	Initial Version	Ghanma, Issa	Wang, Kevin

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