RF Test Report

For

Applicant Name:	**Hangzhou Lawaken Technology Co., Ltd.**
Address:	No.1312, Building 19, Shidaitianyuancheng Cangqian St., Yuhang District Hangzhou, Zhejiang
EUT Name:	AR Glass
Brand Name:	Lawaken
Model Number:	LAWK-ML-S3

Issued By

Company Name:	**BTF Testing Lab (Shenzhen) Co., Ltd.**
Address:	F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
Report Number:	BTF240116R00402
Test Standards:	47 CFR Part 15E
Test Conclusion:	Pass
FCC ID:	2BEOP-LAWKMLS3
Test Date:	2024-01-17 to 2024-01-30
Date of Issue:	2024-01-31
Prepared By:	Gavin Cui / Project Engineer
Date:	2024-01-31
Approved By:	Ryan.CJ / EMC Manager
Date:	2024-01-31

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Revision History		
Version	Issue Date	Revisions Content
R_V0	2024-01-31	Original
Note: Once the revision has been made, then previous versions reports are invalid.		

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1 Introduction

1.1 Identification of Testing Laboratory

Company Name:	BTF Testing Lab (Shenzhen) Co., Ltd.
Address:	F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
Phone Number:	+86-0755-23146130
Fax Number:	+86-0755-23146130

1.2 Identification of the Responsible Testing Location

Company Name:	BTF Testing Lab (Shenzhen) Co., Ltd.
Address:	F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
Phone Number:	+86-0755-23146130
Fax Number:	+86-0755-23146130
FCC Registration Number:	518915
Designation Number:	CN1330

1.3 Announcement

(1) The test report reference to the report template version v0.
(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.
(3) The test report is invalid if there is any evidence and/or falsification.
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2 Product Information

2.1 Application Information

Company Name:	Hangzhou Lawaken Technology Co., Ltd.
Address:	No.1312, Building 19, Shidaitianyuancheng Cangqian St., Yuhang District Hangzhou, Zhejiang

2.2 Manufacturer Information

Company Name:	Hangzhou Lawaken Technology Co., Ltd.
Address:	No.1312, Building 19, Shidaitianyuancheng Cangqian St., Yuhang District Hangzhou, Zhejiang

2.3 Factory Information

Company Name:	Tonly Technology Co., Ltd.
Address:	Section 37, Zhongkai High-tech Development Zone, Huizhou City, Guangdong Province, P.R. China

2.4 General Description of Equipment under Test (EUT)

EUT Name:	AR Glass
Test Model Number:	LAWK-ML-S3
Software Version:	lawk_dldtool_user_2700_378_r412_r66_en
Hardware Version:	400802-062118

2.5 Technical Information

Rating:	Input: DC 5V, 1.5A DC 3.85V From Battery
Operation Frequency:	802.11a/n(HT20)/ac(HT20)/ax(HE20): U-NII Band 1: 5180MHz to 5240MHz; 802.11n(HT40)/ac(HT40)/ax(HE40): U-NII Band 1: 5190MHz to 5230MHz; 802.11ac(HT80)/ax(HE80): U-NII Band 1: 5210MHz;
Number of Channels:	802.11a/n(HT20)/ac(HT20): U-NII Band 1: 4; 802.11n(HT40)/ac(HT40): U-NII Band 1: 2; 802.11ac(HT80)/: U-NII Band 1: 1;
Modulation Type:	802.11a: OFDM(BPSK, QPSK, 16QAM, 64QAM); 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM); 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM);
Antenna Type:	FPC Antenna
Antenna Gain#:	0.11dBi
Note: #: The antenna gain provided by the applicant, and the laboratory will not be responsible for the accumulated calculation results which covers the information provided by the applicant.	

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3 Summary of Test Results

3.1 Test Standards

The tests were performed according to following standards:
47 CFR Part 15E: Unlicensed National Information Infrastructure Devices

3.2 Uncertainty of Test

Item	Measurement Uncertainty
Conducted Emission (150 kHz-30 MHz)	±2.64dB
Transmitter Power, Conducted	±0.87dB
Power Spectral Density	±0.69dB
Occupied Bandwidth	±69kHz
Radiated Spurious Emissions (above 1GHz)	1-6GHz: ±3.94dB 6-18GHz: ±4.16dB
Radiated Spurious Emissions (30M - 1GHz)	±4.12dB
The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

3.3 Summary of Test Result

Item	Standard	Requirement	Result
Antenna requirement	47 CFR Part 15E	Part 15.203	Pass
Conducted Emission at AC power line	47 CFR Part 15E	47 CFR Part 15.207(a)	Pass
Duty Cycle	47 CFR Part 15E		Pass
Maximum conducted output power	47 CFR Part 15E	47 CFR Part 15.407(a)(1)(i) 47 CFR Part 15.407(a)(1)(ii) 47 CFR Part 15.407(a)(1)(iii) 47 CFR Part 15.407(a)(1)(iv)	Pass
Power spectral density	47 CFR Part 15E	47 CFR Part 15.407(a)(1)(i) 47 CFR Part 15.407(a)(1)(ii) 47 CFR Part 15.407(a)(1)(iii) 47 CFR Part 15.407(a)(1)(iv)	Pass
Emission bandwidth and occupied bandwidth	47 CFR Part 15E	U-NII 1, U-NII 2A, U-NII 2C: No limits, only for report use.	Pass
Band edge emissions (Radiated)	47 CFR Part 15E	47 CFR Part 15.407(b)(1) 47 CFR Part 15.407(b)(10)	Pass
Undesirable emission limits (below 1GHz)	47 CFR Part 15E	47 CFR Part 15.407(b)(9)	Pass
Undesirable emission limits (above 1GHz)	47 CFR Part 15E	47 CFR Part 15.407(b)(1) 47 CFR Part 15.407(b)(10)	Pass

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4 Test Configuration

4.1 Test Equipment List

Conducted Emission at AC power line					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Pulse Limiter	SCHWARZBECK	VTSD 9561-F	00953	/	/
Coaxial Switcher	SCHWARZBECK	CX210	CX210	/	/
V-LISN	SCHWARZBECK	NSLK 8127	01073	2023-11-16	2024-11-15
LISN	AFJ	LS16/110VAC	16010020076	2023-02-23	2024-02-22
EMI Receiver	ROHDE&SCHWARZ	ESCI3	101422	2023-11-15	2024-11-14

Duty Cycle Maximum conducted output power Power spectral density Emission bandwidth and occupied bandwidth					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
RFTest software	/	V1.00	/	/	/
RF Control Unit	Techy	TR1029-1	/	/	/
RF Sensor Unit	Techy	TR1029-2	/	/	/
Programmable constant temperature and humidity box	ZZCKONG	ZZ-K02A	20210928007	2023-11-16	2024-11-15
Adjustable Direct Current Regulated Power Supply	Dongguan Tongmen Electronic Technology Co., LTD	etm-6050c	20211026123	/	/
WIDEBAND RADIO COMMNUNICATION TESTER	Rohde & Schwarz	CMW500	161997	2023-11-16	2024-11-15
MXA Signal Analyzer	KEYSIGHT	N9020A	MY50410020	2023-11-16	2024-11-15

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Band edge emissions (Radiated) Undesirable emission limits (below 1GHz) Undesirable emission limits (above 1GHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Coaxial cable Multiflex 141	Schwarzbeck	N/SMA 0.5m	517386	2023-03-24	2024-03-23
Preamplifier	SCHWARZBECK	BBV9744	00246	/	/
RE Cable	REBES Talent	UF1-SMASMAM-10m	21101566	/	/
RE Cable	REBES Talent	UF2-NMNM-10m	21101570	/	/
RE Cable	REBES Talent	UF1-SMASMAM-1m	21101568	/	/
RE Cable	REBES Talent	UF2-NMNM-1m	21101576	/	/
RE Cable	REBES Talent	UF2-NMNM-2.5m	21101573	/	/
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/
Horn Antenna	SCHWARZBECK	BBHA9170	01157	2023-11-13	2024-11-12
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI7	101032	2023-11-16	2024-11-15
SIGNAL ANALYZER	ROHDE&SCHWARZ	FSQ40	100010	2023-11-16	2024-11-15
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/
Broadband Preamplilifier	SCHWARZBECK	BBV9718D	00008	2023-03-24	2024-03-23
Horn Antenna	SCHWARZBECK	BBHA9120D	2597	2022-05-22	2024-05-21
EZ_EMC	Frad	FA-03A2 RE+	/	/	/
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/
Log periodic antenna	SCHWARZBECK	VULB 9168	01328	2023-11-13	2024-11-12

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4.2 Test Auxiliary Equipment

The EUT was tested as an independent device.

4.3 Test Modes

No.	Test Modes	Description
TM1	802.11a mode	Keep the EUT in continuously transmitting mode with 802.11a modulation type. All data rates has been tested and found the data rate @ 6Mbps is the worst case. Only the data of worst case is recorded in the report.
TM2	802.11n mode	Keep the EUT in continuously transmitting mode with 802.11n modulation type. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report.
TM3	802.11ac mode	Keep the EUT in continuously transmitting mode with 802.11ac modulation type. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report.

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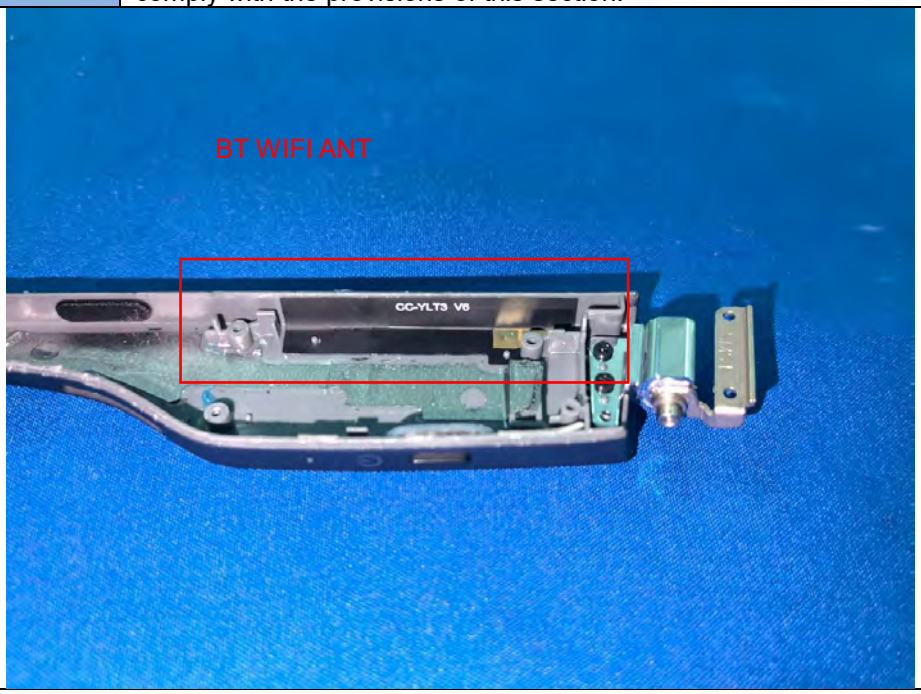
5 Evaluation Results (Evaluation)

5.1 Antenna requirement

Test Requirement:	Refer to 47 CFR Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.



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6 Radio Spectrum Matter Test Results (RF)

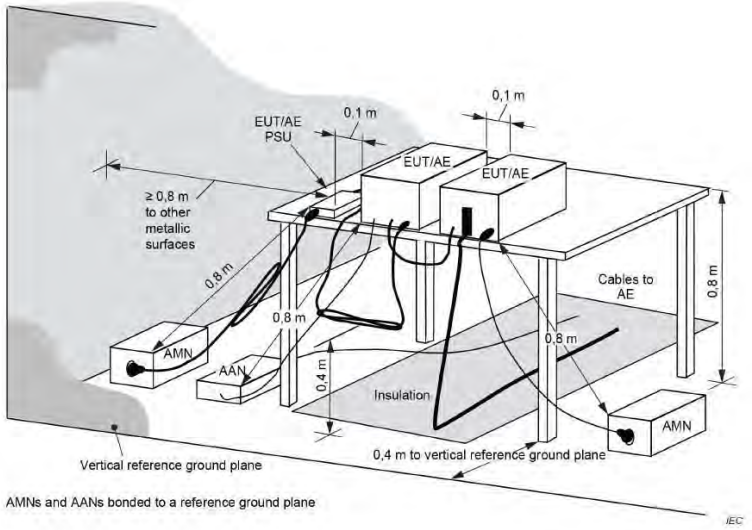
6.1 Conducted Emission at AC power line

Test Requirement:	47 CFR Part 15.207(a)		
Test Method:	ANSI C63.10-2020 section 6.2		
Test Limit:	Frequency of emission (MHz)	Conducted limit (dBμV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
	*Decreases with the logarithm of the frequency.		

6.1.1 E.U.T. Operation:

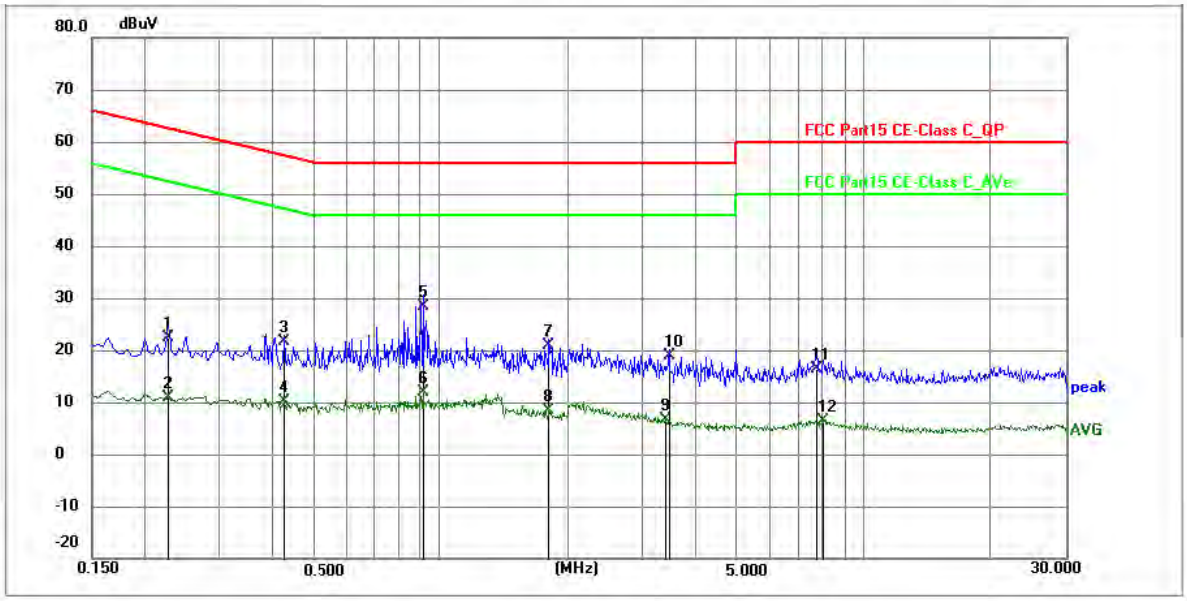
Operating Environment:	
Temperature:	24.5 °C
Humidity:	53.5 %
Atmospheric Pressure:	1010 mbar

6.1.2 Test Setup Diagram:



6.1.3 Test Data:

Note: All the mode have been tested, and only the worst mode are in the report
TM1 / Line: Line / Band: 5150-5250 MHz / BW: 20 / CH: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.2265	11.94	10.56	22.50	62.58	-40.08	QP	P	
2	0.2265	0.28	10.56	10.84	52.58	-41.74	AVG	P	
3	0.4245	11.03	10.57	21.60	57.36	-35.76	QP	P	
4	0.4245	-0.50	10.57	10.07	47.36	-37.29	AVG	P	
5 *	0.9105	17.73	10.67	28.40	56.00	-27.60	QP	P	
6	0.9105	1.16	10.67	11.83	46.00	-34.17	AVG	P	
7	1.8015	10.13	10.67	20.80	56.00	-35.20	QP	P	
8	1.8015	-2.17	10.67	8.50	46.00	-37.50	AVG	P	
9	3.4035	-3.92	10.64	6.72	46.00	-39.28	AVG	P	
10	3.4710	8.27	10.63	18.90	56.00	-37.10	QP	P	
11	7.7145	5.60	10.80	16.40	60.00	-43.60	QP	P	
12	8.0115	-4.32	10.81	6.49	50.00	-43.51	AVG	P	

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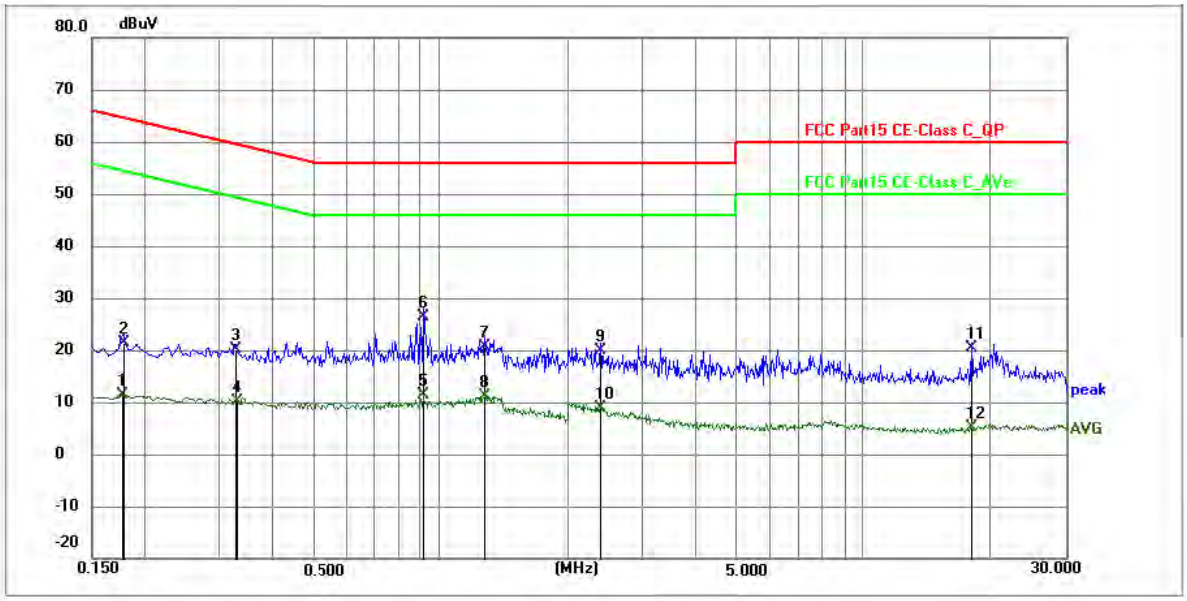
TM1 / Line: Neutral / Band: 5150-5250 MHz / BW: 20 / CH: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1768	0.86	10.51	11.37	54.63	-43.26	AVG	P	
2	0.1770	10.99	10.51	21.50	64.63	-43.13	QP	P	
3	0.3255	9.53	10.57	20.10	59.57	-39.47	QP	P	
4	0.3300	-0.39	10.57	10.18	49.45	-39.27	AVG	P	
5	0.9105	0.76	10.67	11.43	46.00	-34.57	AVG	P	
6 *	0.9150	15.73	10.67	26.40	56.00	-29.60	QP	P	
7	1.2705	9.94	10.66	20.60	56.00	-35.40	QP	P	
8	1.2705	0.45	10.66	11.11	46.00	-34.89	AVG	P	
9	2.3865	9.13	10.67	19.80	56.00	-36.20	QP	P	
10	2.3865	-1.69	10.67	8.98	46.00	-37.02	AVG	P	
11	18.0060	9.33	10.97	20.30	60.00	-39.70	QP	P	
12	18.0060	-5.73	10.97	5.24	50.00	-44.76	AVG	P	

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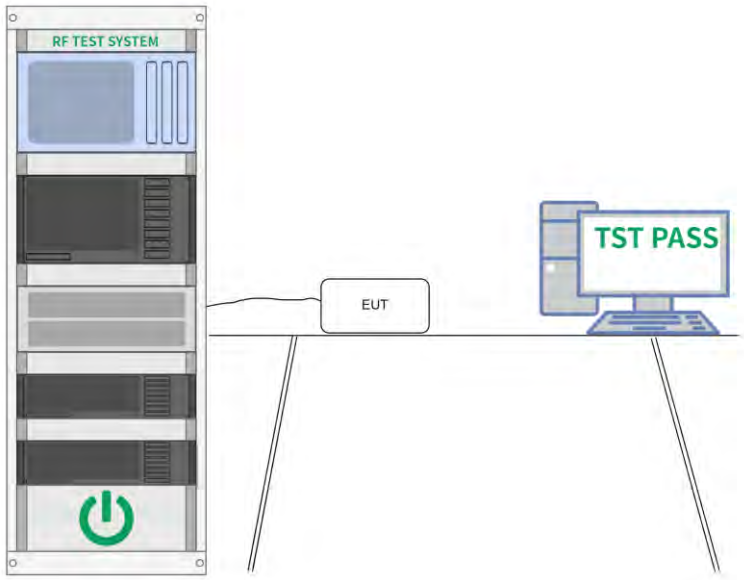
6.2 Duty Cycle

Test Requirement:	All measurements are to be performed with the EUT transmitting at 100% duty cycle at its maximum power control level; however, if 100% duty cycle cannot be achieved, measurements of duty cycle, x, and maximum-power transmission duration, T, are required for each tested mode of operation.
Test Method:	ANSI C63.10-2020 section 12.2 (b)
Test Limit:	No limits, only for report use.
Procedure:	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. 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.

6.2.1 E.U.T. Operation:

Operating Environment:	
Temperature:	23.4 °C
Humidity:	46.4 %
Atmospheric Pressure:	1010 mbar

6.2.2 Test Setup Diagram:



6.2.3 Test Data:

Please Refer to Appendix for Details.

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6.3 Maximum conducted output power

Test Requirement:	47 CFR Part 15.407(a)(1)(i) 47 CFR Part 15.407(a)(1)(ii) 47 CFR Part 15.407(a)(1)(iii) 47 CFR Part 15.407(a)(1)(iv)
Test Method:	ANSI C63.10-2013, section 12.4
Test Limit:	For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm). For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power is required for each 1 dB of antenna gain in excess of 23 dBi. 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. For 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. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
Procedure:	Refer to ANSI C63.10-2020 section 12.4

6.3.1 E.U.T. Operation:

Operating Environment:	
Temperature:	23.4 °C
Humidity:	46.4 %
Atmospheric Pressure:	1010 mbar

6.3.2 Test Setup Diagram:

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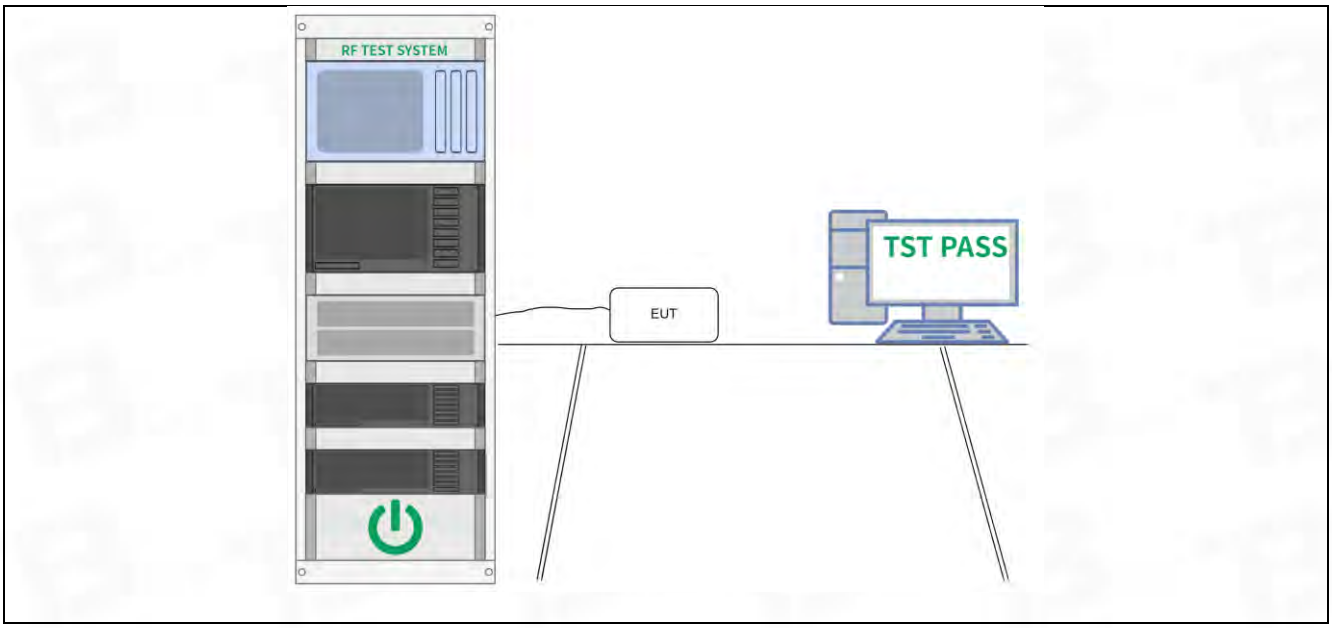

6.3.3 Test Data:

Please Refer to Appendix for Details.

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6.4 Power spectral density

Test Requirement:	47 CFR Part 15.407(a)(1)(i) 47 CFR Part 15.407(a)(1)(ii) 47 CFR Part 15.407(a)(1)(iii) 47 CFR Part 15.407(a)(1)(iv)
Test Method:	ANSI C63.10-2020, section 12.6
Test Limit:	For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. 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. For client devices in the 5.15-5.25 GHz band, 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, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
Procedure:	Refer to ANSI C63.10-2020, section 12.6

6.4.1 E.U.T. Operation:

Operating Environment:	
Temperature:	23.4 °C
Humidity:	46.4 %
Atmospheric Pressure:	1010 mbar

6.4.2 Test Setup Diagram:

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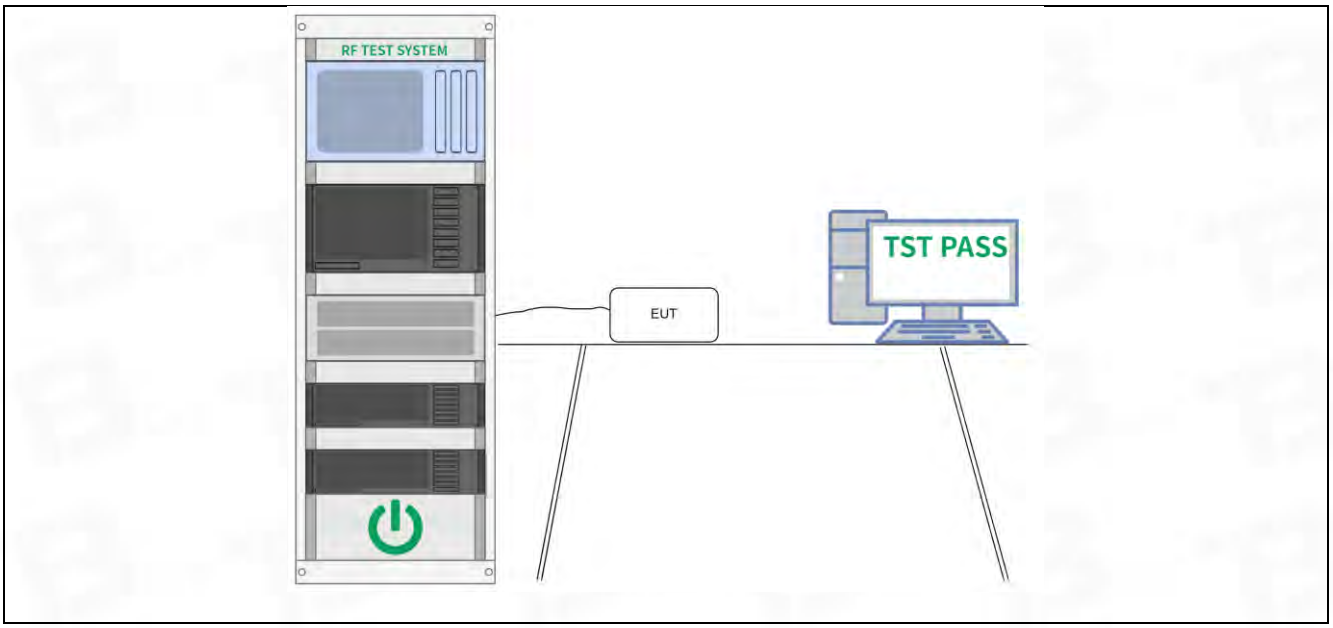

6.4.3 Test Data:

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6.5 Emission bandwidth and occupied bandwidth

Test Requirement:	U-NII 1, U-NII 2A, U-NII 2C: No limits, only for report use.
Test Method:	ANSI C63.10-2020, section 6.9 & 12.5
Test Limit:	U-NII 1, U-NII 2A, U-NII 2C: No limits, only for report use.
Procedure:	Emission bandwidth: a) Set RBW = approximately 1% of the emission bandwidth. b) Set the VBW > RBW. c) Detector = peak. d) Trace mode = max hold. e) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the instrument. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%. Occupied bandwidth: a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW. b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement. c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2. d) Step a) through step c) might require iteration to adjust within the specified range. e) 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. f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth. g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies. h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument

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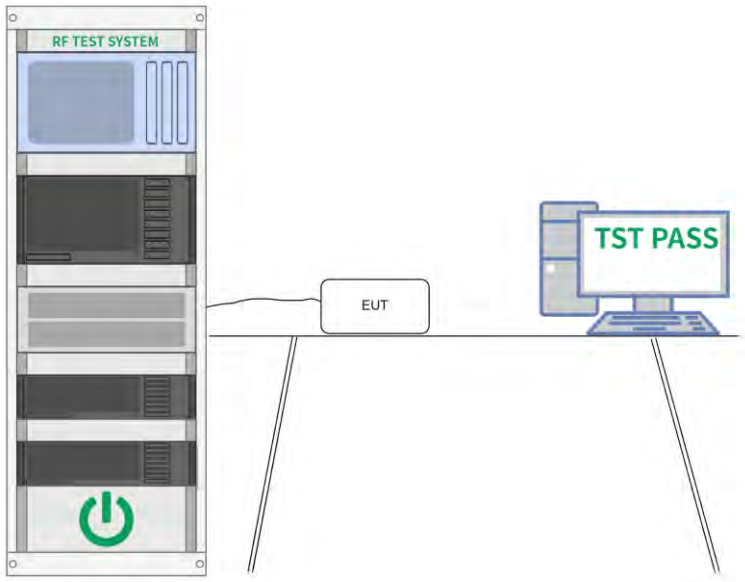
	display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

6.5.1 E.U.T. Operation:

Operating Environment:	
Temperature:	23.4 °C
Humidity:	46.4 %
Atmospheric Pressure:	1010 mbar

6.5.2 Test Setup Diagram:



6.5.3 Test Data:

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6.6 Band edge emissions (Radiated)

Test Requirement:	47 CFR Part 15.407(b)(1) 47 CFR Part 15.407(b)(10)
Test Method:	ANSI C63.10-2020, section 12.7.4, 12.7.6, 12.7.7
Test Limit:	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.

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	([2])
13.36-13.41			

[1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2]Above 38.6

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in § 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in § 15.209shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in § 15.209shall be demonstrated based on the average value of the measured emissions. The provisions in § 15.35apply to these measurements.

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 (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands

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	54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241. In the emission table above, the tighter limit applies at the band edges. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
Procedure:	Above 1GHz: a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet. g. Test the EUT in the lowest channel, the middle channel, the Highest channel. h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. i. Repeat above procedures until all frequencies measured was complete. Remark: 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor 2. Scan from 18GHz to 40GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. 3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report. 4. The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

6.6.1 E.U.T. Operation:

Operating Environment:	
Temperature:	23.7 °C
Humidity:	51 %
Atmospheric Pressure:	1010 mbar

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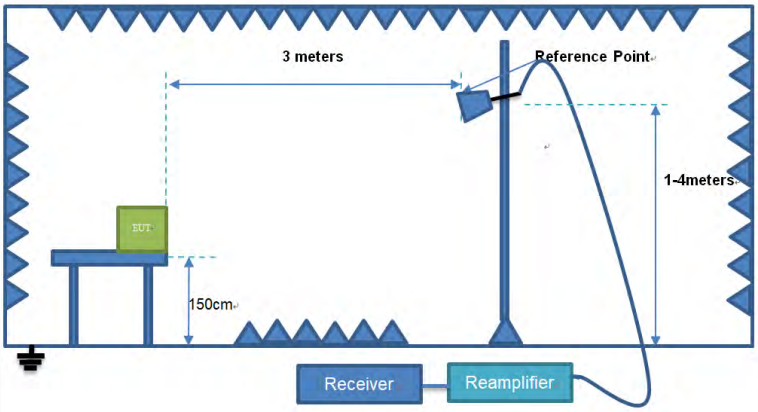
6.6.2 Test Setup Diagram:



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6.6.3 Test Data:

Note: All the mode have been tested, and only the worst mode 802.11a are in the report

TM1 / Polarization: Horizontal / Band: 5150-5250 MHz / BW: 20 / CH: L

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1 *	5052.928	3.55	44.86	48.41	74.00	-25.59	peak	P
2	5150.000	0.14	44.93	45.07	74.00	-28.93	peak	P

TM1 / Polarization: Vertical / Band: 5150-5250 MHz / BW: 20 / CH: L

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1 *	5100.104	42.39	5.29	47.68	74.00	-26.32	peak	P
2	5150.000	39.13	5.33	44.46	74.00	-29.54	peak	P

TM1 / Polarization: Horizontal / Band: 5150-5250 MHz / BW: 20 / CH: H

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	5350.000	-1.27	45.05	43.78	74.00	-30.22	peak	P
2 *	5460.000	0.89	45.12	46.01	74.00	-27.99	peak	P

TM1 / Polarization: Vertical / Band: 5150-5250 MHz / BW: 20 / CH: H

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1 *	5350.000	-5310.82	5355.45	44.63	74.00	-29.37	peak	P
2	5460.000	-5421.05	5465.52	44.47	74.00	-29.53	peak	P

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6.7 Undesirable emission limits (below 1GHz)

<table>
<tr><td>Test Requirement:</td><td>47 CFR Part 15.407(b)(9)</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10-2020, section 12.7.4, 12.7.5</td></tr>
<tr><td>Test Limit:</td><td>Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 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:
<table>
<tr><td>Frequency (MHz)</td><td>Field strength (microvolts/meter)</td><td>Measurement distance (meters)</td></tr>
<tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100 **</td><td>3</td></tr>
<tr><td>88-216</td><td>150 **</td><td>3</td></tr>
<tr><td>216-960</td><td>200 **</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.</td></tr>
<tr><td>Procedure:</td><td>Below 1GHz:
a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using quasi-peak method as specified and then reported in a data sheet.
g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
i. Repeat above procedures until all frequencies measured was complete.
Remark:
1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The</td></tr>
</table>

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	points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. 3. The disturbance below 1GHz was very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. Above 1GHz: a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet. g. Test the EUT in the lowest channel, the middle channel, the Highest channel. h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. i. Repeat above procedures until all frequencies measured was complete. Remark: 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor 2. Scan from 18GHz to 40GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. 3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report. 4. The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

6.7.1 E.U.T. Operation:

Operating Environment:	
Temperature:	24.5 °C
Humidity:	53.5 %
Atmospheric Pressure:	1010 mbar

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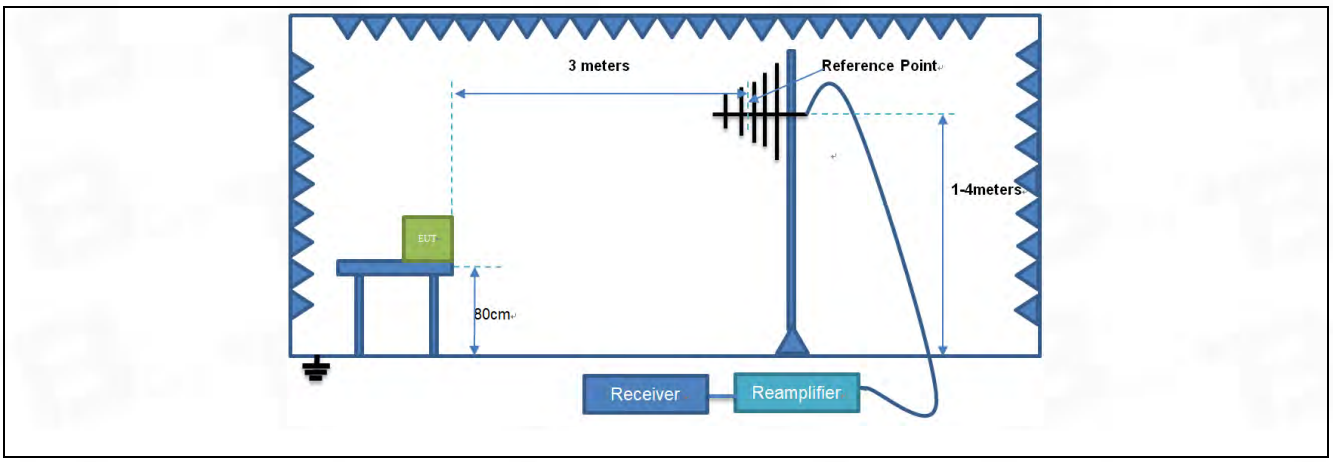
6.7.2 Test Setup Diagram:



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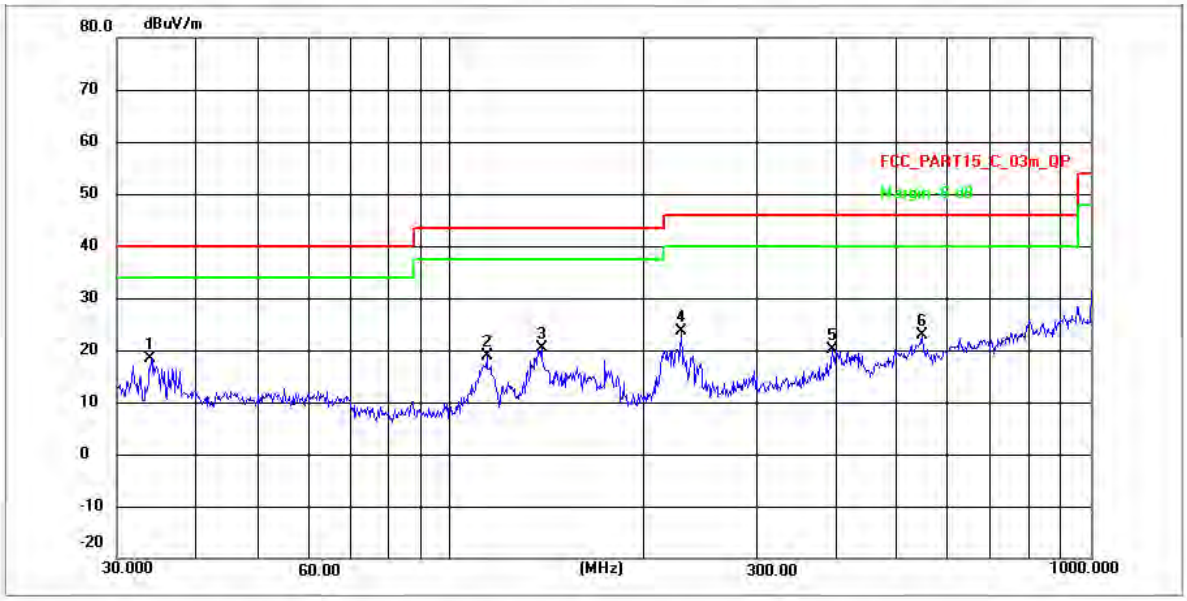
6.7.3 Test Data:

Note: All the mode have been tested, and only the worst mode are in the report
TM1 / Polarization: Horizontal / Band: 5150-5250 MHz / BW: 20 / CH: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1 *	34.0363	33.27	-14.88	18.39	40.00	-21.61	peak	P
2	113.9137	46.47	-27.53	18.94	43.50	-24.56	peak	P
3	138.6300	47.80	-27.36	20.44	43.50	-23.06	peak	P
4	229.2930	50.31	-26.72	23.59	46.00	-22.41	peak	P
5	394.8543	45.58	-25.38	20.20	46.00	-25.80	peak	P
6	546.1390	47.40	-24.43	22.97	46.00	-23.03	peak	P

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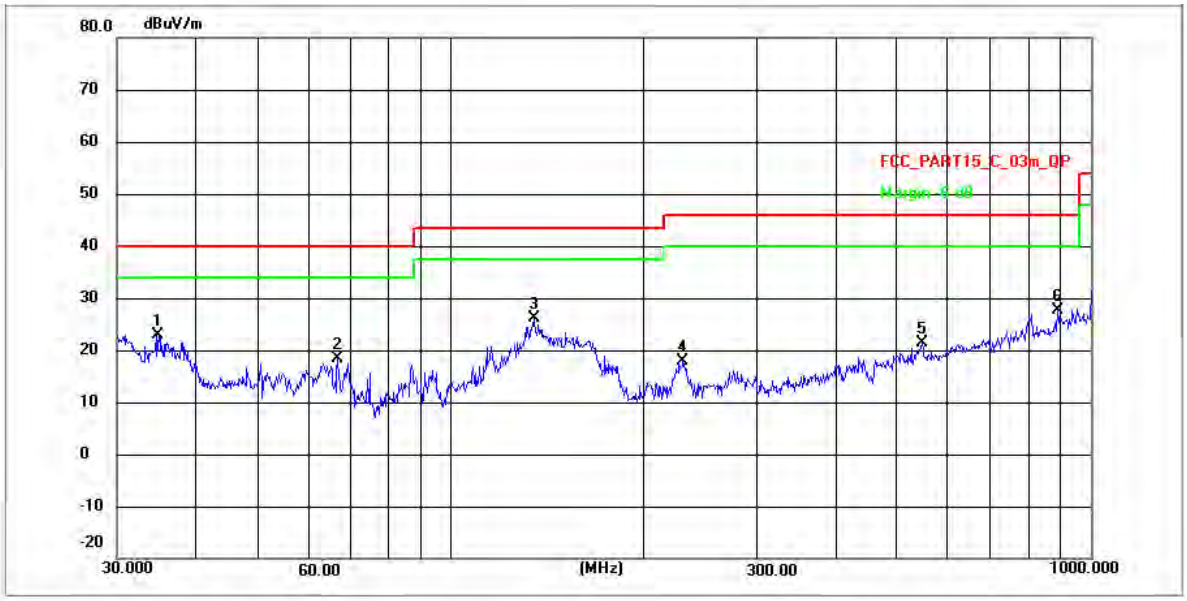
TM1 / Polarization: Vertical / Band: 5150-5250 MHz / BW: 20 / CH: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1 *	34.9434	40.03	-17.03	23.00	40.00	-17.00	peak	P
2	66.2660	34.89	-16.45	18.44	40.00	-21.56	peak	P
3	134.7950	53.55	-27.39	26.16	43.50	-17.34	peak	P
4	230.5021	44.64	-26.72	17.92	46.00	-28.08	peak	P
5	546.1390	45.81	-24.43	21.38	46.00	-24.62	peak	P
6	890.7277	50.03	-22.36	27.67	46.00	-18.33	peak	P

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6.8 Undesirable emission limits (above 1GHz)

Test Requirement:	47 CFR Part 15.407(b)(1) 47 CFR Part 15.407(b)(10)
Test Method:	ANSI C63.10-2020, section 12.7.4, 12.7.6, 12.7.7
Test Limit:	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.

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	([2])
13.36-13.41			

[1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2]Above 38.6

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in § 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in § 15.209shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in § 15.209shall be demonstrated based on the average value of the measured emissions. The provisions in § 15.35apply to these measurements.

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 (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands

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	54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241. In the emission table above, the tighter limit applies at the band edges. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
Procedure:	Above 1GHz: a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet. g. Test the EUT in the lowest channel, the middle channel, the Highest channel. h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. i. Repeat above procedures until all frequencies measured was complete. Remark: 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor 2. Scan from 18GHz to 40GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. 3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report. 4. The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

6.8.1 E.U.T. Operation:

Operating Environment:	
Temperature:	23.3 °C
Humidity:	54.3 %
Atmospheric Pressure:	1010 mbar

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6.8.2 Test Data:

Note: All of the mode had be tested, only the worse mode of 802.11a are show in the report:

TM1 / Polarization: Horizontal / Band: 5150-5250 MHz / BW: 20 / CH: L

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	4367.058	65.76	-28.84	36.92	74.00	-37.08	peak	P
2	5898.442	70.93	-25.65	45.28	74.00	-28.72	peak	P
3	7263.015	71.20	-24.85	46.35	74.00	-27.65	peak	P
4	8995.123	71.86	-24.32	47.54	74.00	-26.46	peak	P
5	12009.761	71.33	-22.18	49.15	74.00	-24.85	peak	P
6 *	15046.851	71.45	-20.50	50.95	74.00	-23.05	peak	P

TM1 / Polarization: Vertical / Band: 5150-5250 MHz / BW: 20 / CH: L

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	3671.746	69.25	-29.03	40.22	74.00	-33.78	peak	P
2	4417.841	68.99	-28.82	40.17	74.00	-33.83	peak	P
3	5730.395	71.06	-26.20	44.86	74.00	-29.14	peak	P
4	7390.070	72.18	-24.81	47.37	74.00	-26.63	peak	P
5	10453.970	74.22	-24.49	49.73	74.00	-24.27	peak	P
6 *	13797.088	71.55	-21.04	50.51	74.00	-23.49	peak	P

TM1 / Polarization: Horizontal / Band: 5150-5250 MHz / BW: 20 / CH: M

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	5224.153	69.08	-27.19	41.89	74.00	-32.11	peak	P
2	6815.551	69.86	-25.10	44.76	74.00	-29.24	peak	P
3	9420.880	73.42	-23.37	50.05	74.00	-23.95	peak	P
4	10453.970	74.79	-24.49	50.30	74.00	-23.70	peak	P
5	11667.603	72.70	-22.77	49.93	74.00	-24.07	peak	P
6 *	16600.642	71.67	-19.00	52.67	74.00	-21.33	peak	P

TM1 / Polarization: Vertical / Band: 5150-5250 MHz / BW: 20 / CH: M

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	3912.809	64.52	-29.01	35.51	74.00	-38.49	peak	P
2	5631.874	65.44	-26.53	38.91	74.00	-35.09	peak	P
3	7390.070	70.11	-24.81	45.30	74.00	-28.70	peak	P
4	10514.577	72.66	-24.49	48.17	74.00	-25.83	peak	P
5 *	13797.088	72.98	-21.04	51.94	74.00	-22.06	peak	P
6	16600.642	70.54	-19.00	51.54	74.00	-22.46	peak	P

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TM1 / Polarization: Horizontal / Band: 5150-5250 MHz / BW: 20 / CH: H

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	6142.019	71.31	-25.35	45.96	74.00	-28.04	peak	P
2	7650.888	72.59	-25.00	47.59	74.00	-26.41	peak	P
3	8995.123	74.34	-24.32	50.02	74.00	-23.98	peak	P
4	9866.789	72.43	-24.00	48.43	74.00	-25.57	peak	P
5	12872.441	71.52	-21.41	50.11	74.00	-23.89	peak	P
6 *	16221.189	71.35	-20.53	50.82	74.00	-23.18	peak	P

TM1 / Polarization: Vertical / Band: 5150-5250 MHz / BW: 20 / CH: H

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	3485.601	70.49	-29.07	41.42	74.00	-32.58	peak	P
2	5408.529	68.63	-27.03	41.60	74.00	-32.40	peak	P
3	7562.942	72.26	-24.87	47.39	74.00	-26.61	peak	P
4	9258.909	71.53	-23.73	47.80	74.00	-26.20	peak	P
5	11012.253	70.90	-23.43	47.47	74.00	-26.53	peak	P
6 *	13638.492	72.24	-21.00	51.24	74.00	-22.76	peak	P

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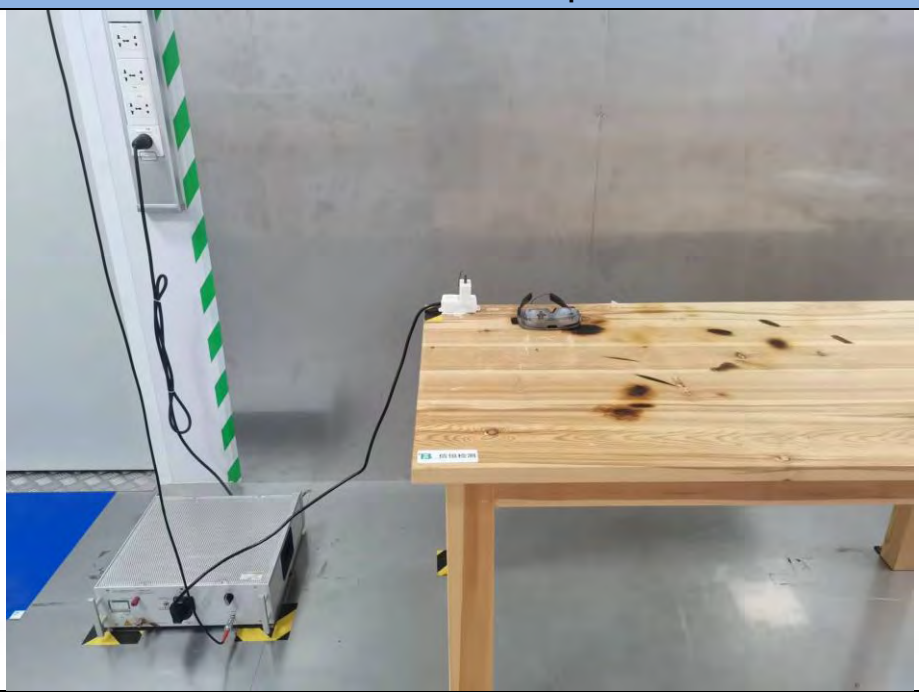
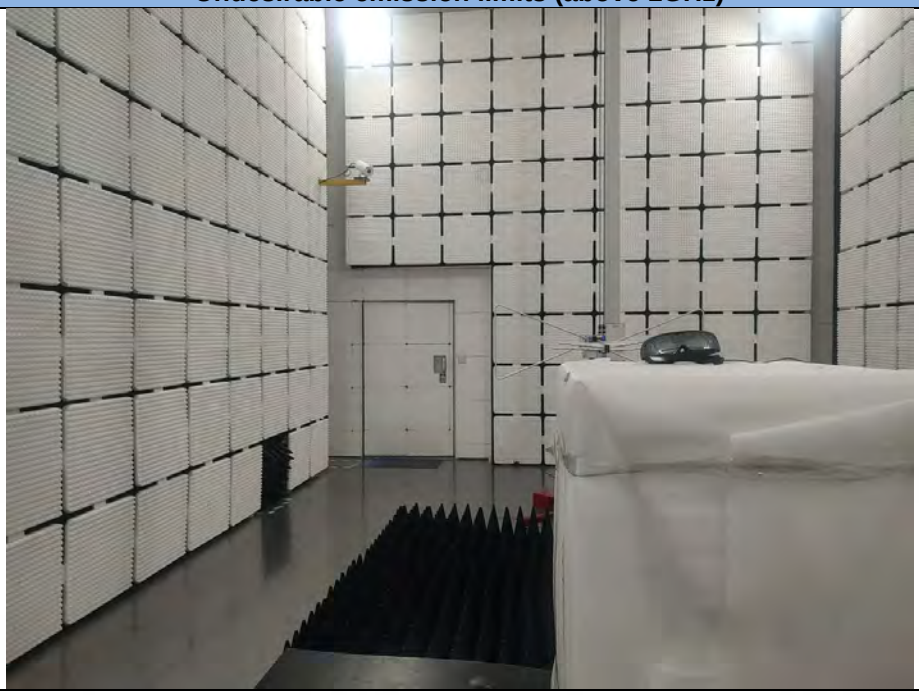
7 Test Setup Photos

Conducted Emission at AC power line


Band edge emissions (Radiated) Undesirable emission limits (above 1GHz)


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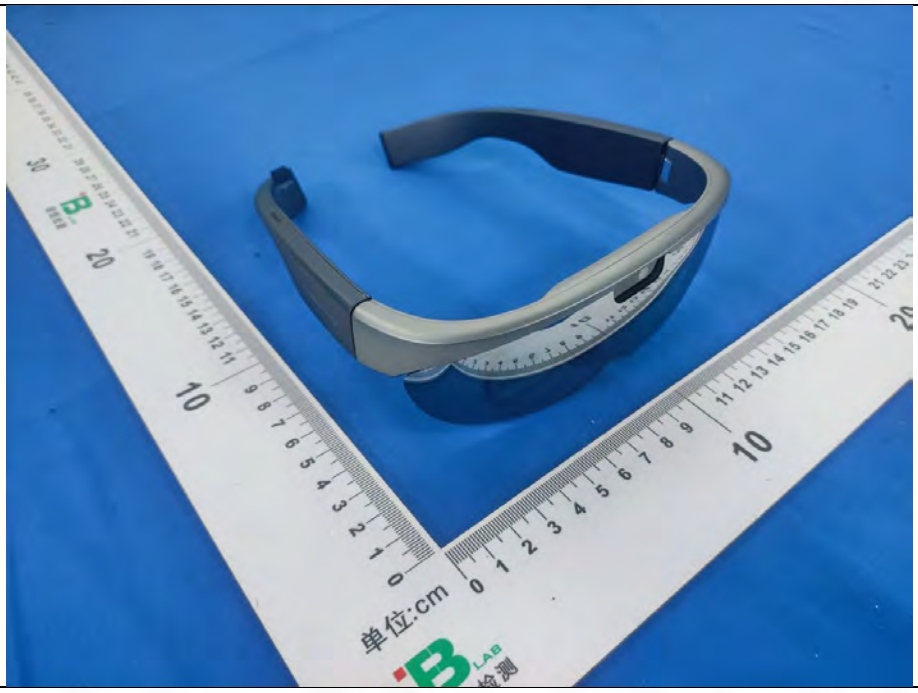
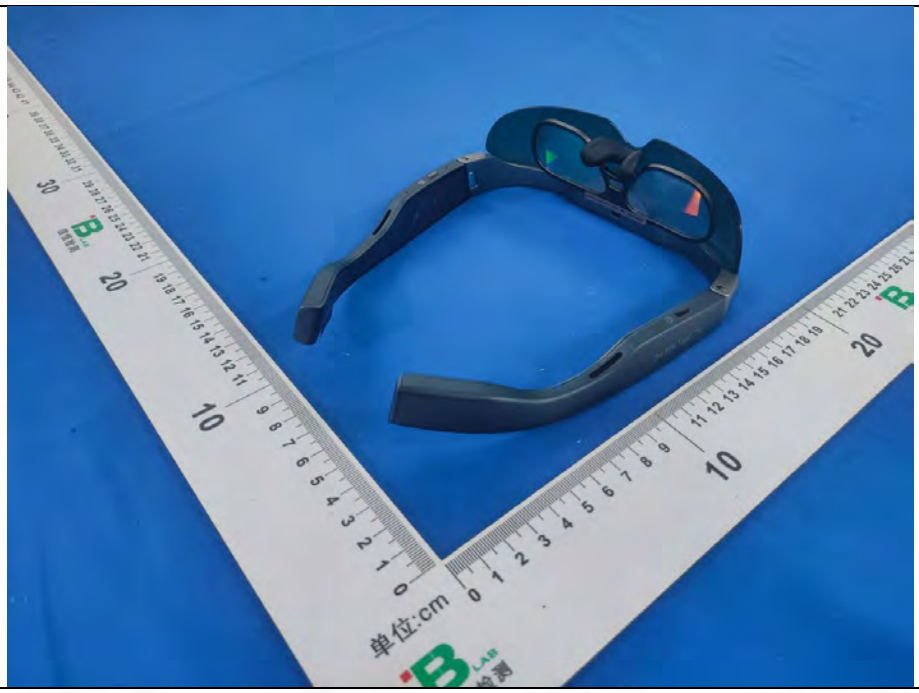
Undesirable emission limits (below 1GHz)

8 EUT Constructional Details (EUT Photos)

External




Internal

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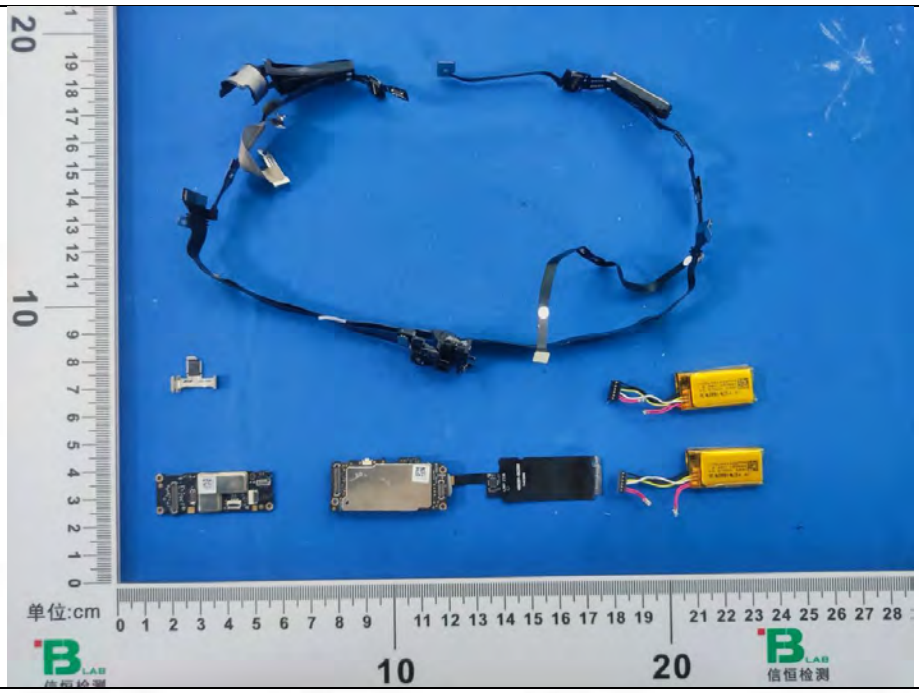

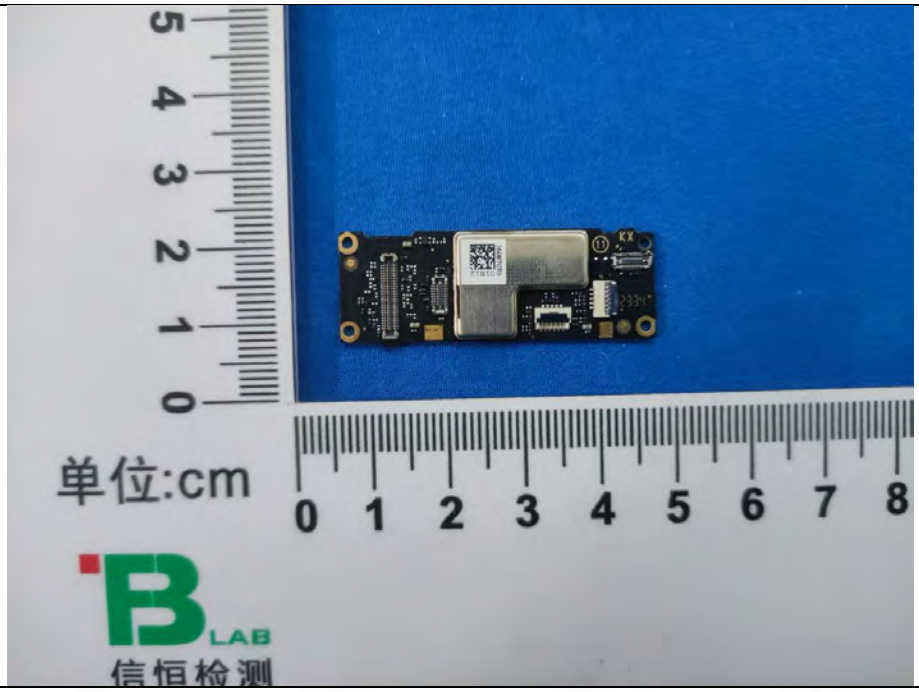

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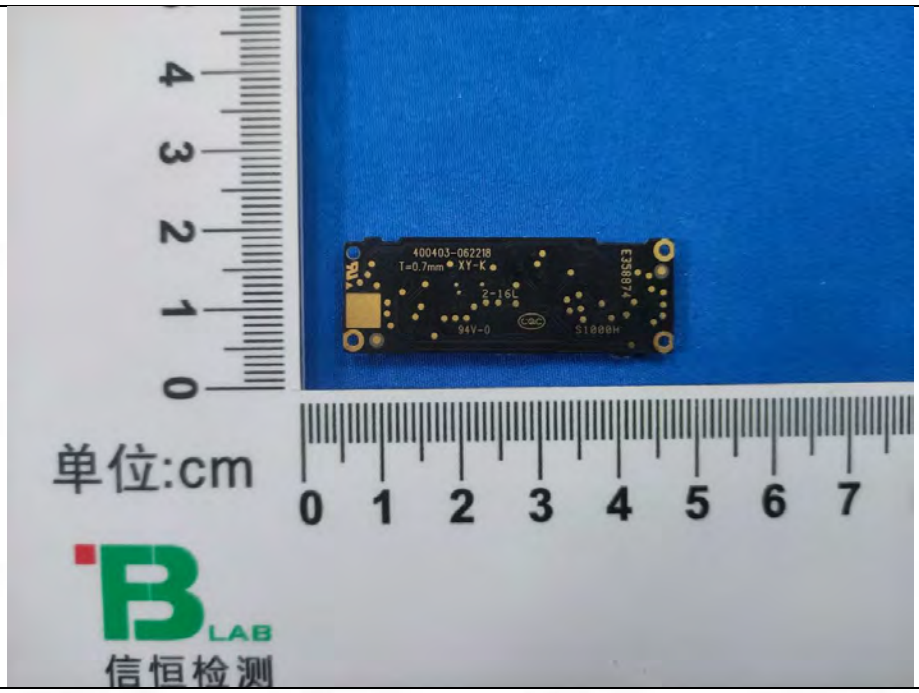

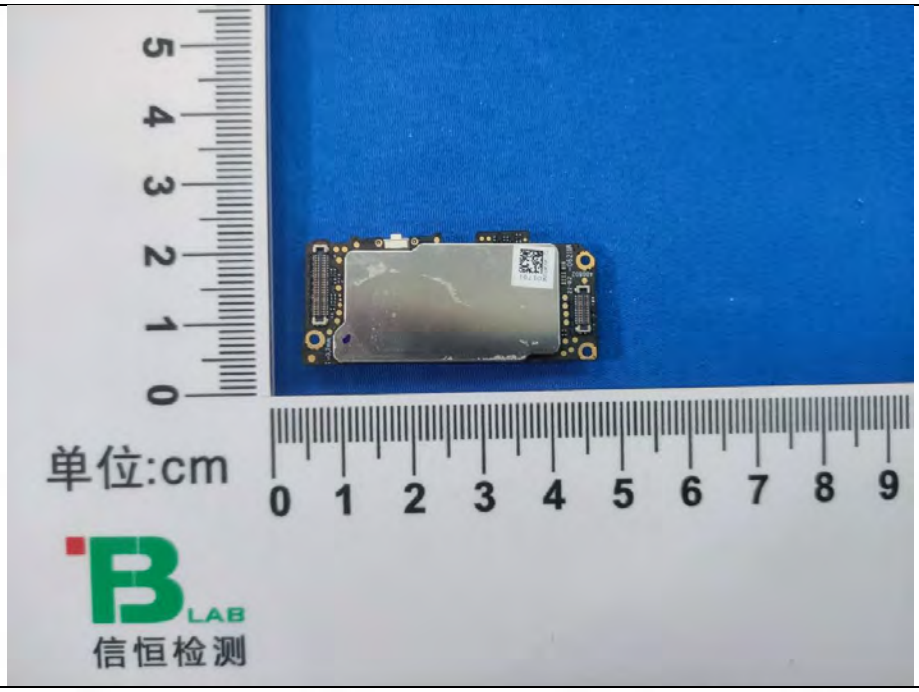

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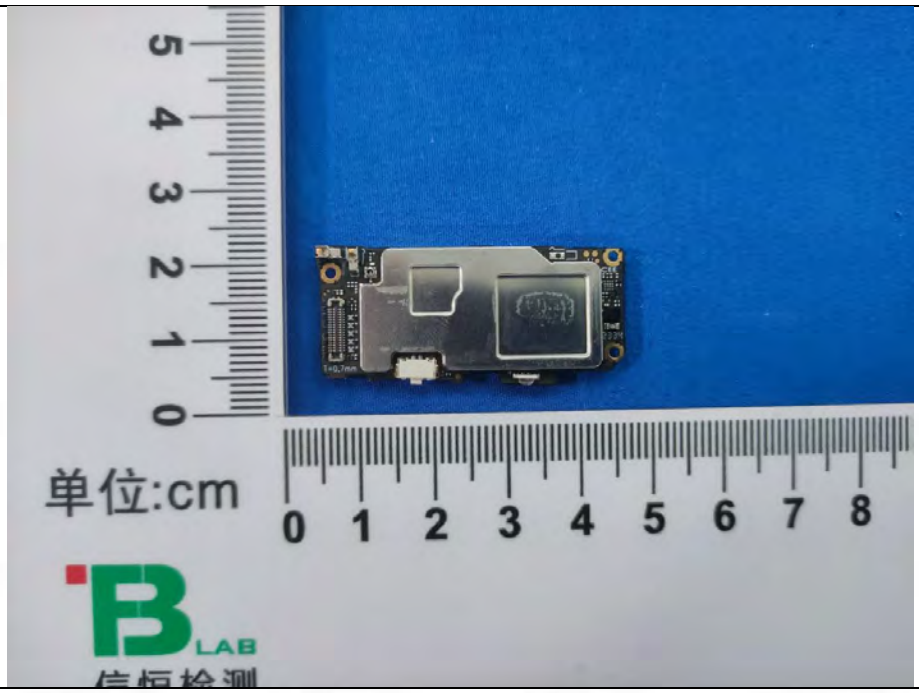

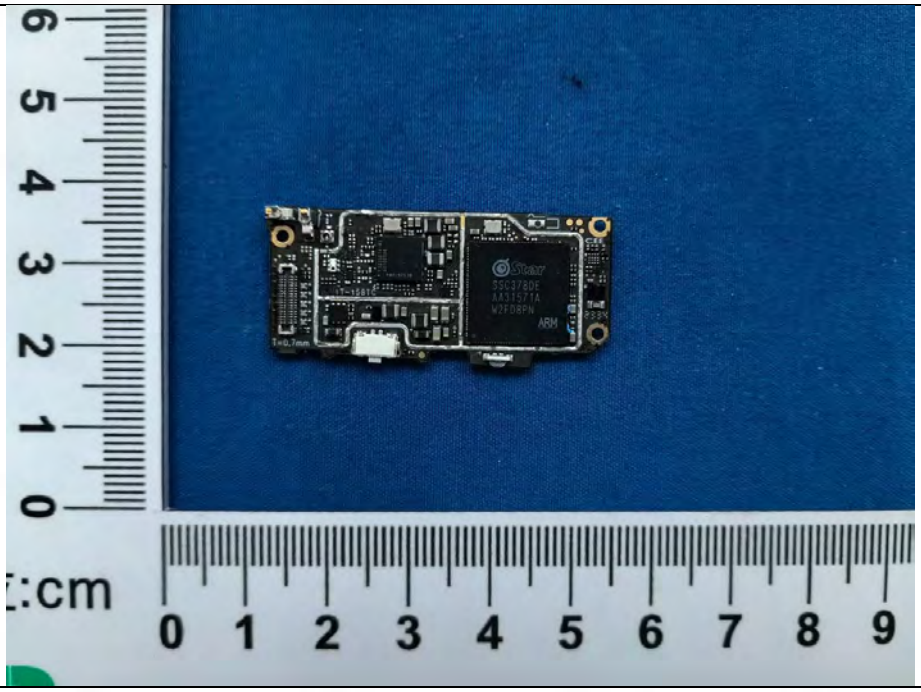

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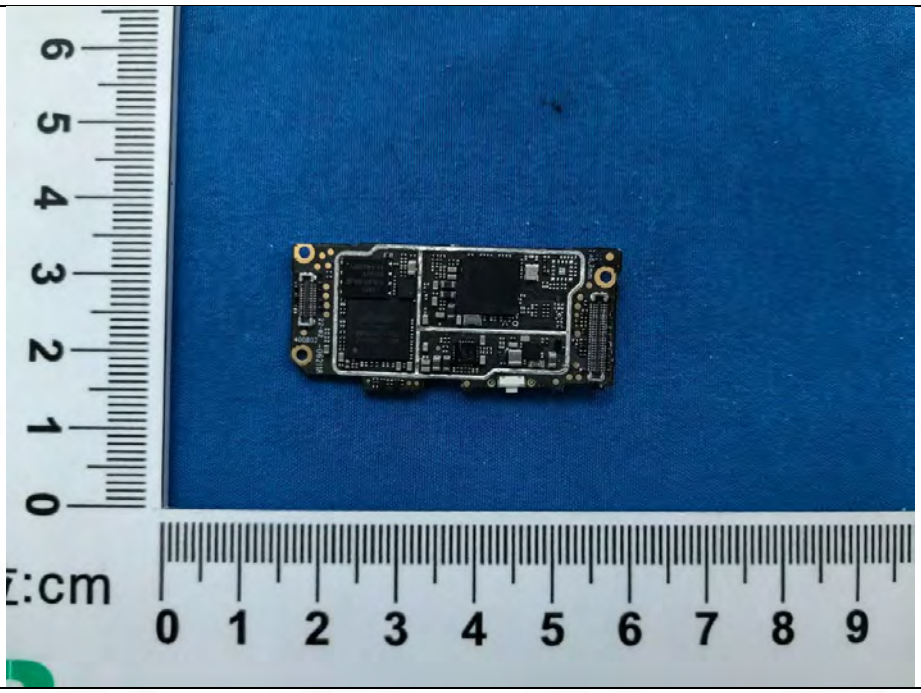

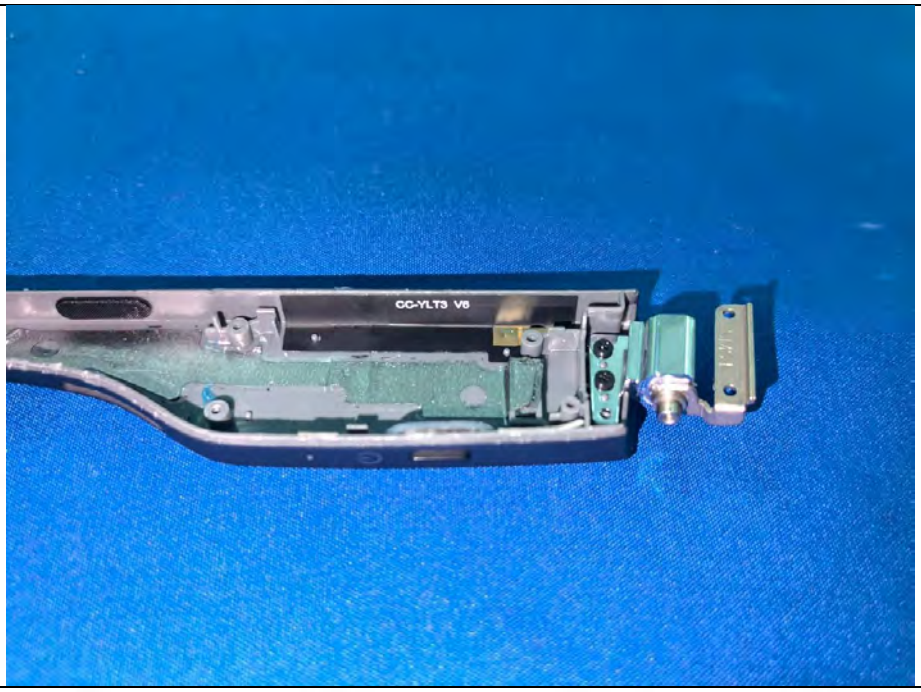

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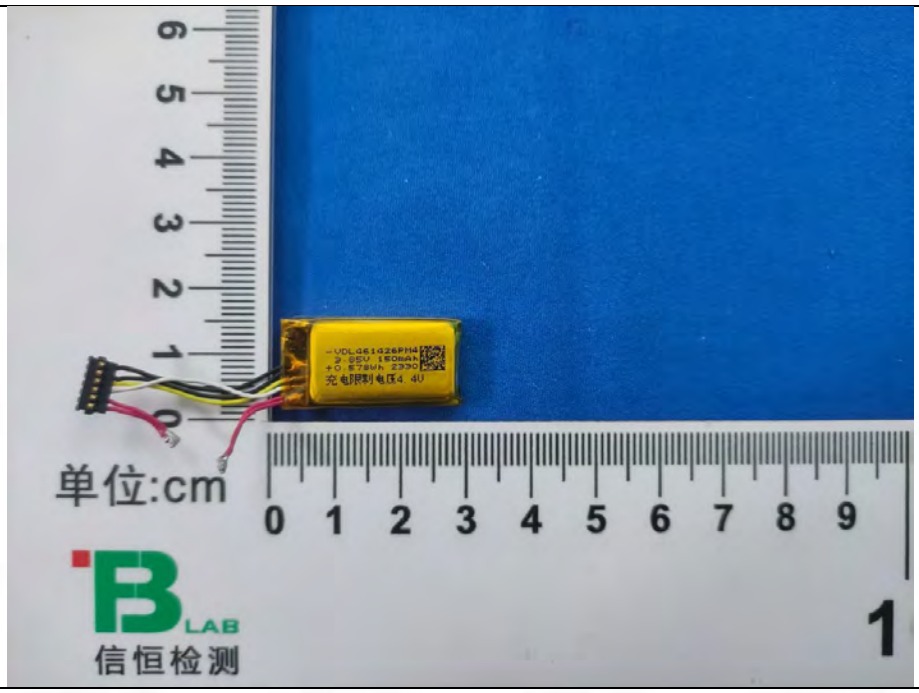
单位:cm
信恒检测

Appendix

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1. Duty Cycle

1.1 Ant1

1.1.1 Test Result

Ant1							
Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
802.11a	SISO	5180	1.395	1.428	97.69	0.10	0.03
		5200	1.394	1.428	97.62	0.10	0.03
		5240	1.394	1.428	97.62	0.10	0.03
802.11n (HT20)	SISO	5180	1.302	1.335	97.53	0.11	0.03
		5200	1.302	1.336	97.46	0.11	0.03
		5240	1.302	1.336	97.46	0.11	0.03
802.11n (HT40)	SISO	5190	1.302	1.336	97.46	0.11	0.03
		5230	0.646	0.679	95.14	0.22	0.03
802.11ac (VHT20)	SISO	5180	1.310	1.344	97.47	0.11	0.03
		5200	1.311	1.344	97.54	0.11	0.03
		5240	1.310	1.344	97.47	0.11	0.03
802.11ac (VHT40)	SISO	5190	0.653	0.687	95.05	0.22	0.00
		5230	0.654	0.688	95.06	0.22	0.03
802.11ac (VHT80)	SISO	5210	0.325	0.358	90.78	0.42	0.04

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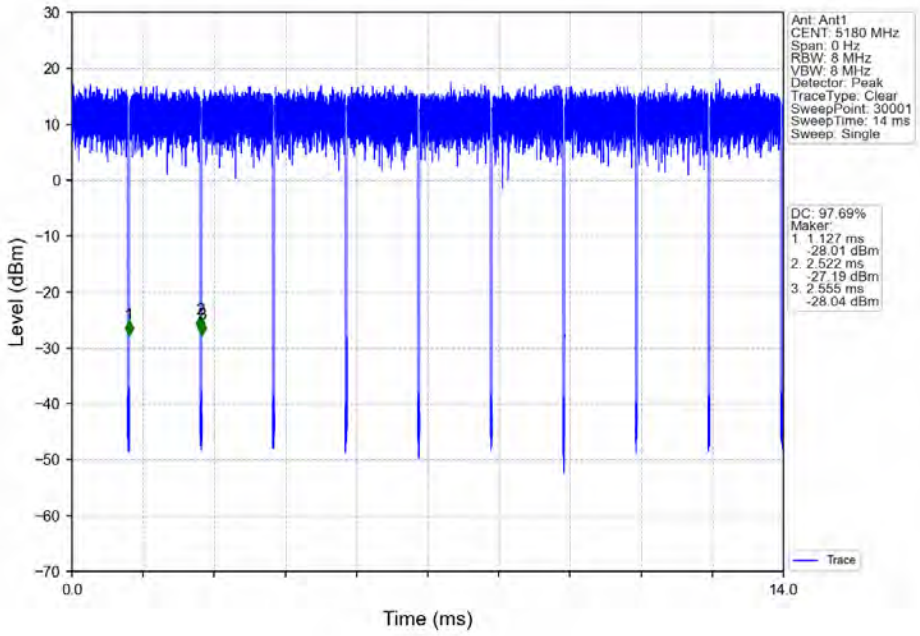
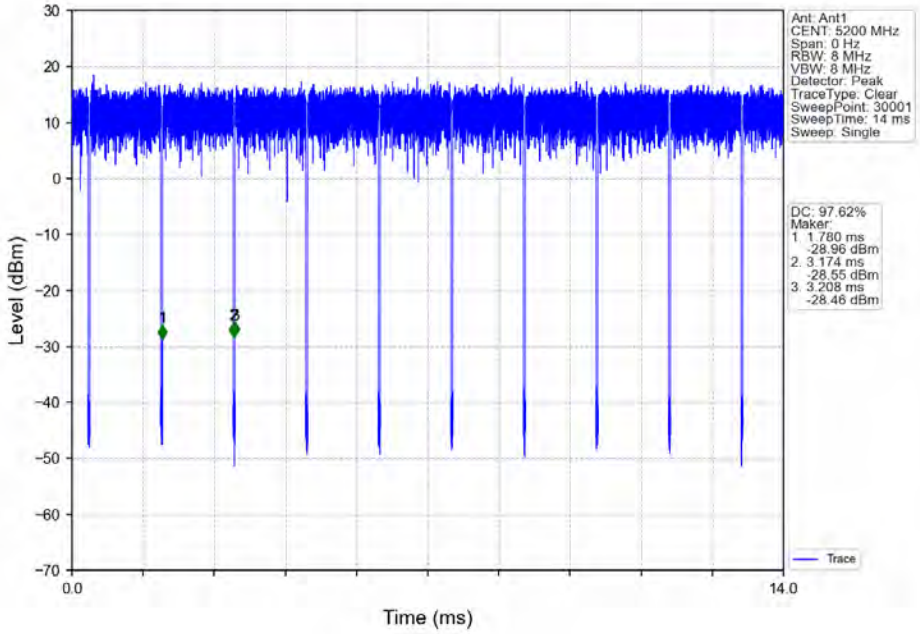
1.1.2 Test Graph

802.11a_LCH_5180MHz_Ant1_NTNV



802.11a_MCH_5200MHz_Ant1_NTNV



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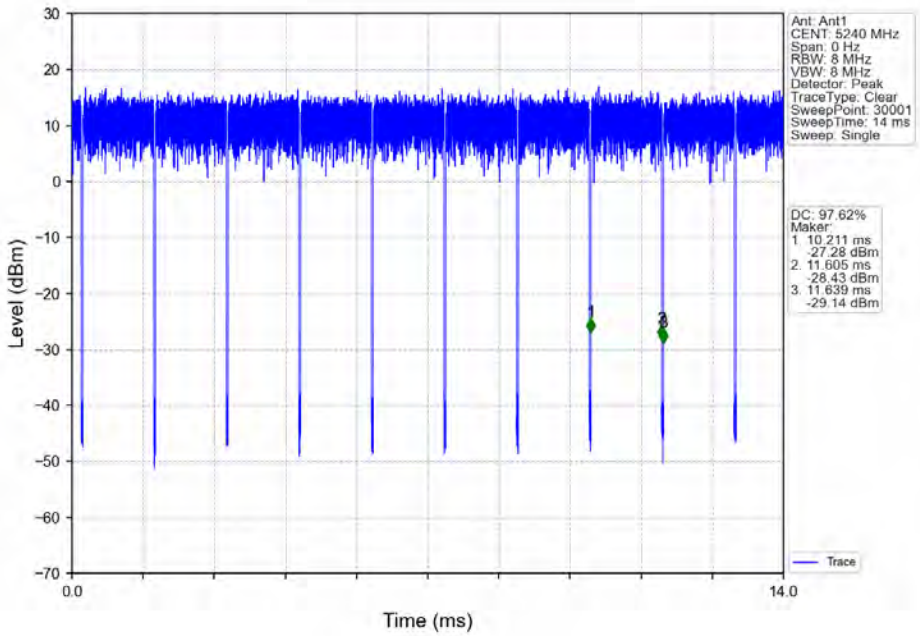
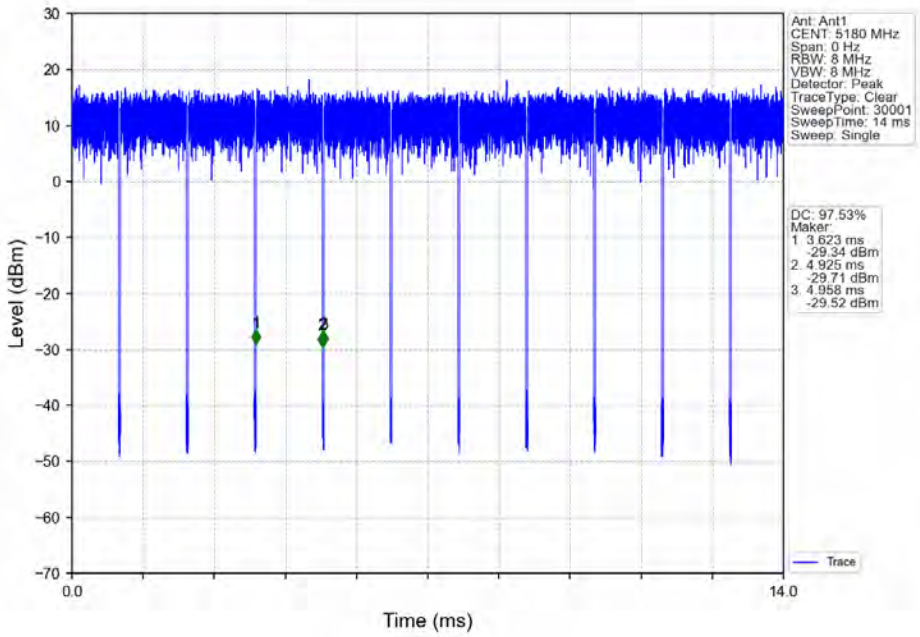
802.11a_HCH_5240MHz_Ant1_NTNV



802.11n(HT20)_LCH_5180MHz_Ant1_NTNV



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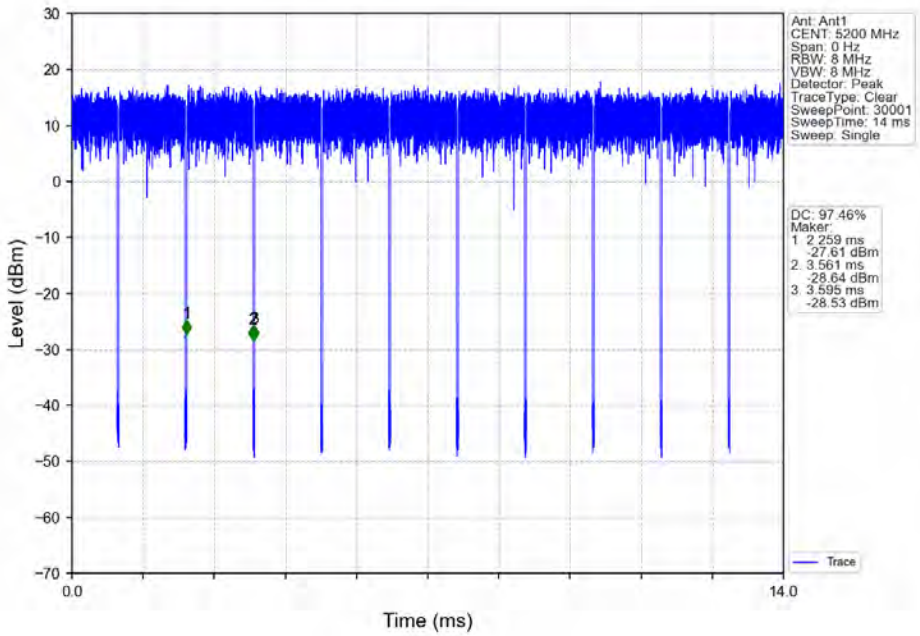
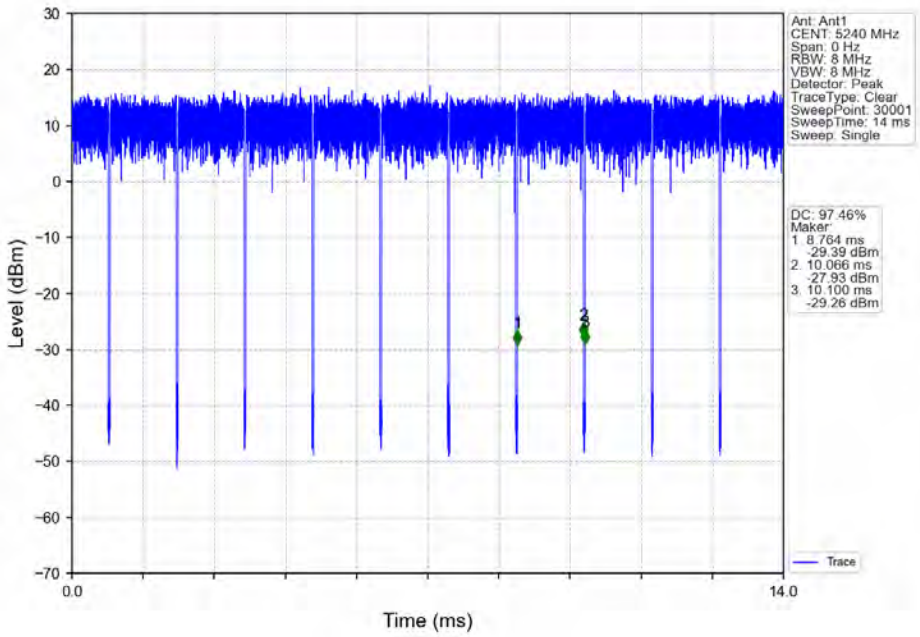
802.11n(HT20)_MCH_5200MHz_Ant1_NTNV



802.11n(HT20)_HCH_5240MHz_Ant1_NTNV



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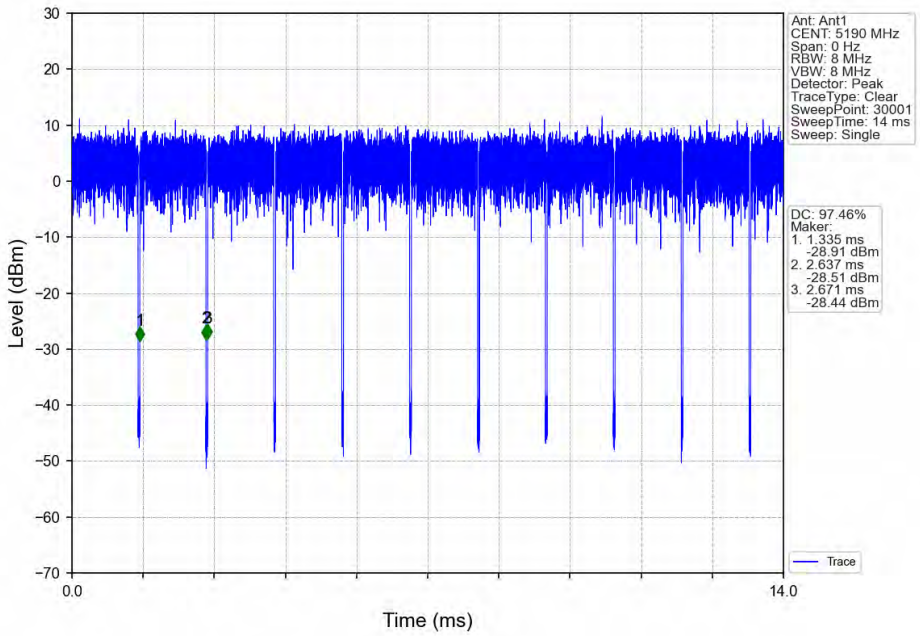
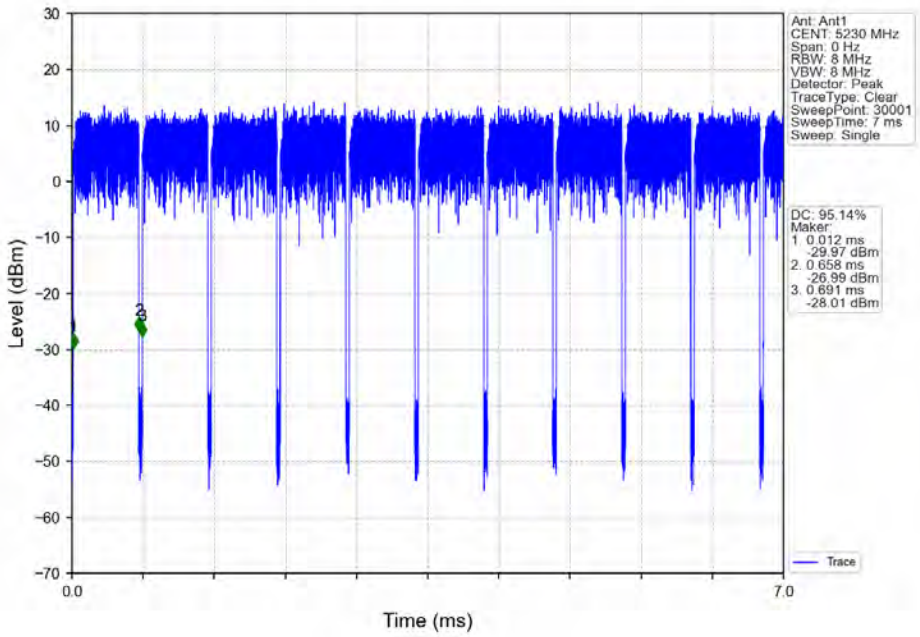
802.11n(HT40)_LCH_5190MHz_Ant1_NTNV



802.11n(HT40)_HCH_5230MHz_Ant1_NTNV



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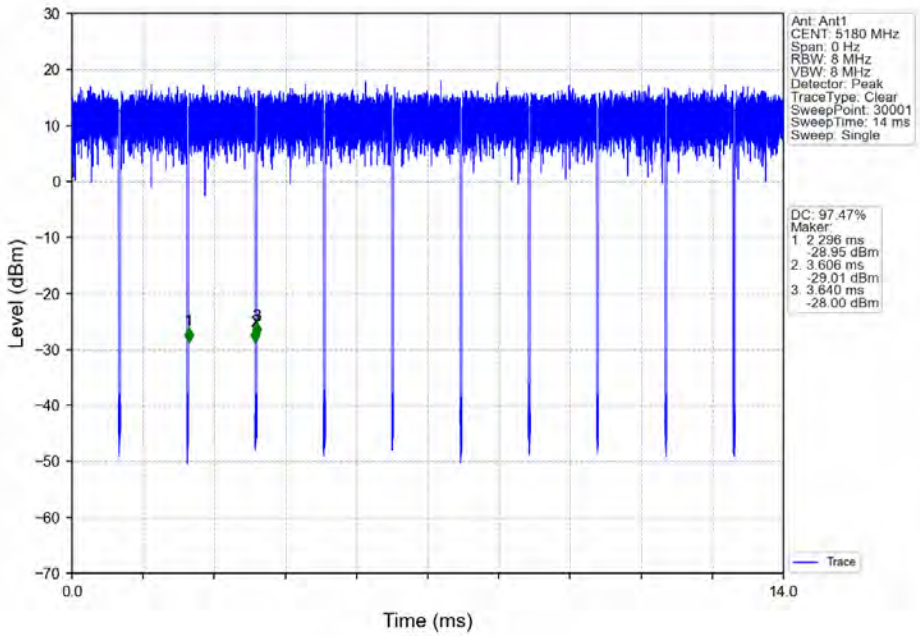
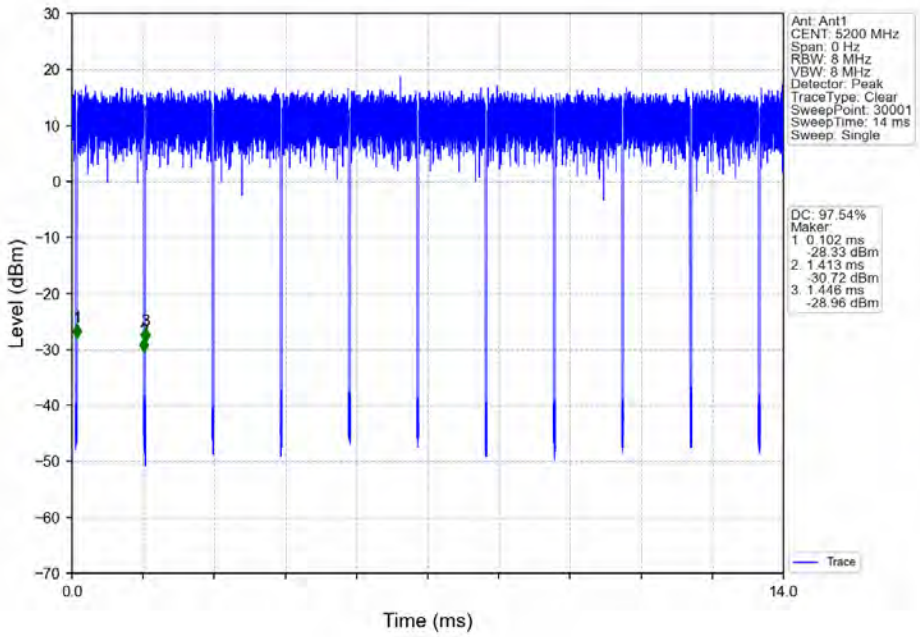
802.11ac(VHT20)_LCH_5180MHz_Ant1_NTNV



802.11ac(VHT20)_MCH_5200MHz_Ant1_NTNV



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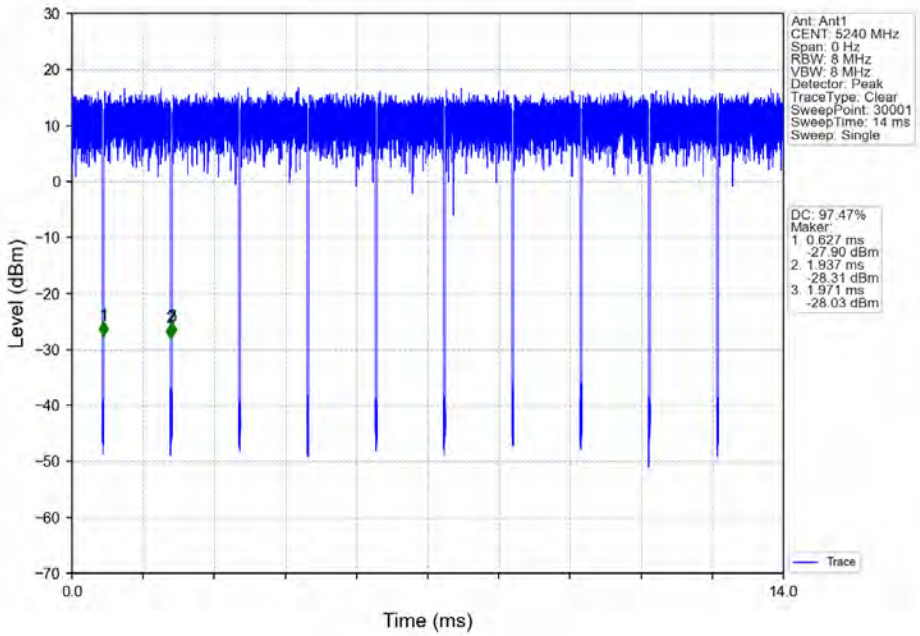
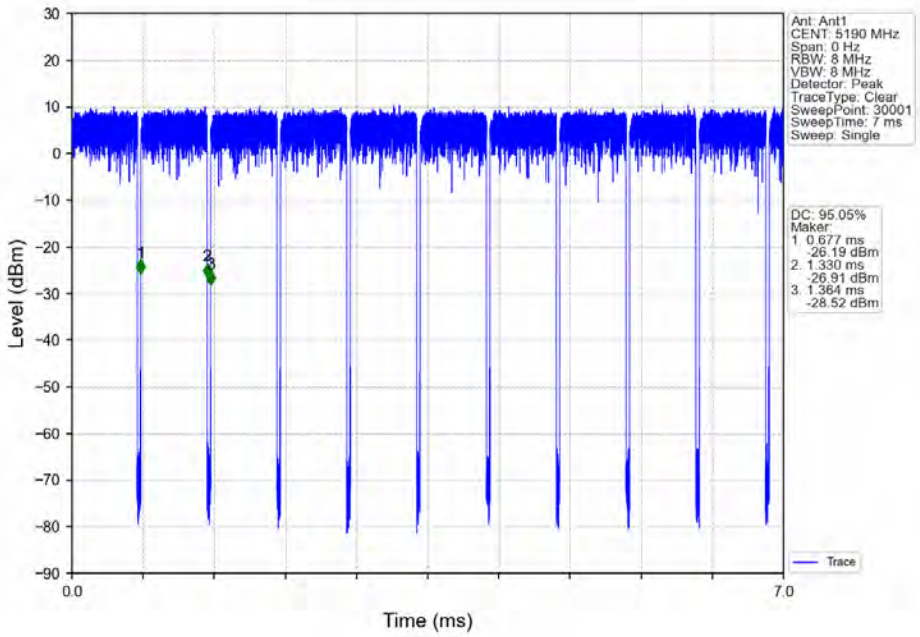
802.11ac(VHT20)_HCH_5240MHz_Ant1_NTNV



802.11ac(VHT40)_LCH_5190MHz_Ant1_NTNV



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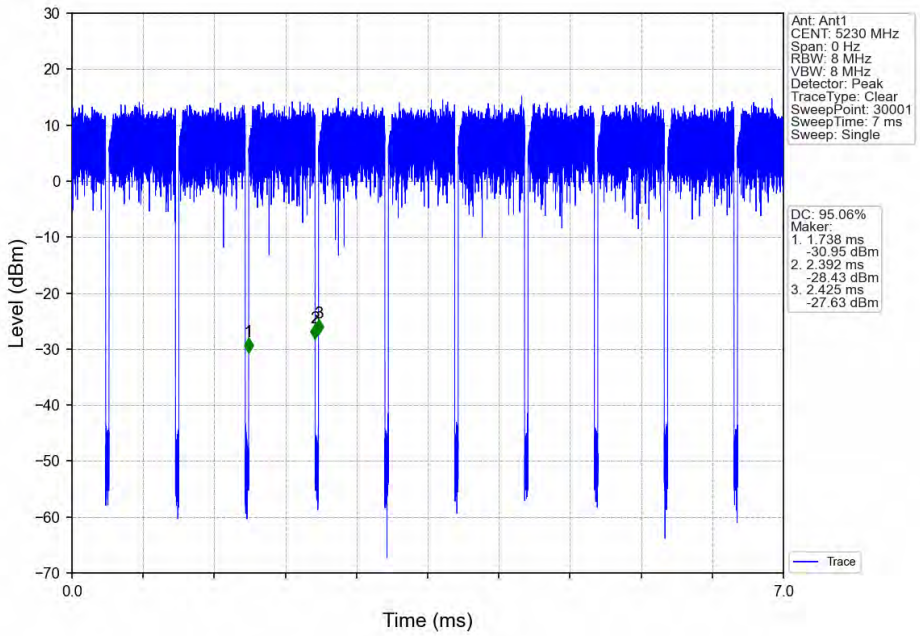
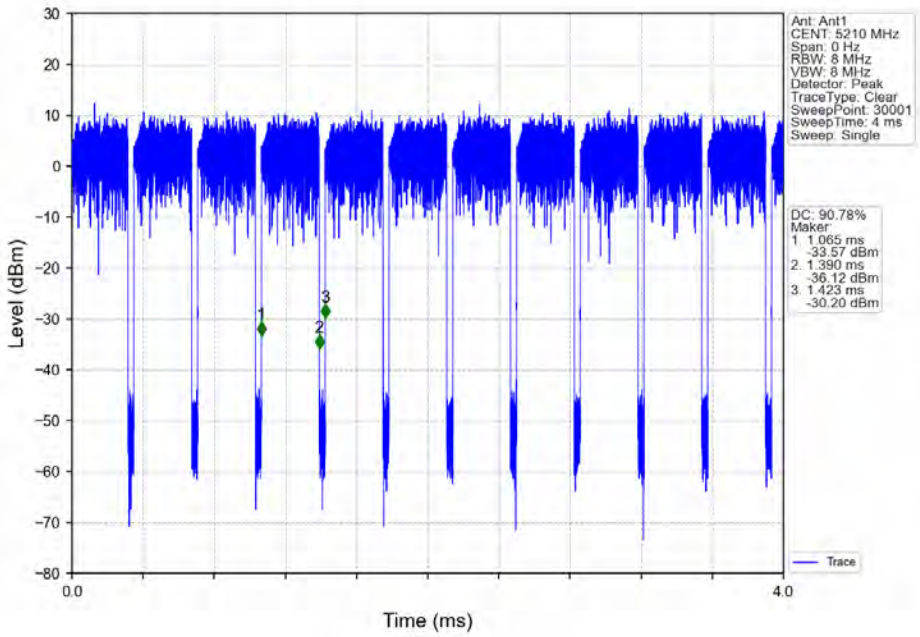
802.11ac(VHT40)_HCH_5230MHz_Ant1_NTNV



802.11ac(VHT80)_MCH_5210MHz_Ant1_NTNV



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2. Bandwidth

2.1 OBW

2.1.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	99% Occupied Bandwidth (MHz)		Verdict
				Result	Limit	
802.11a	SISO	5180	1	17.931	/	Pass
		5200	1	18.335	/	Pass
		5240	1	18.016	/	Pass
802.11n (HT20)	SISO	5180	1	18.920	/	Pass
		5200	1	19.350	/	Pass
		5240	1	18.952	/	Pass
802.11n (HT40)	SISO	5190	1	37.535	/	Pass
		5230	1	37.471	/	Pass
802.11ac (VHT20)	SISO	5180	1	18.702	/	Pass
		5200	1	18.878	/	Pass
		5240	1	18.830	/	Pass
802.11ac (VHT40)	SISO	5190	1	38.160	/	Pass
		5230	1	37.197	/	Pass
802.11ac (VHT80)	SISO	5210	1	76.466	/	Pass

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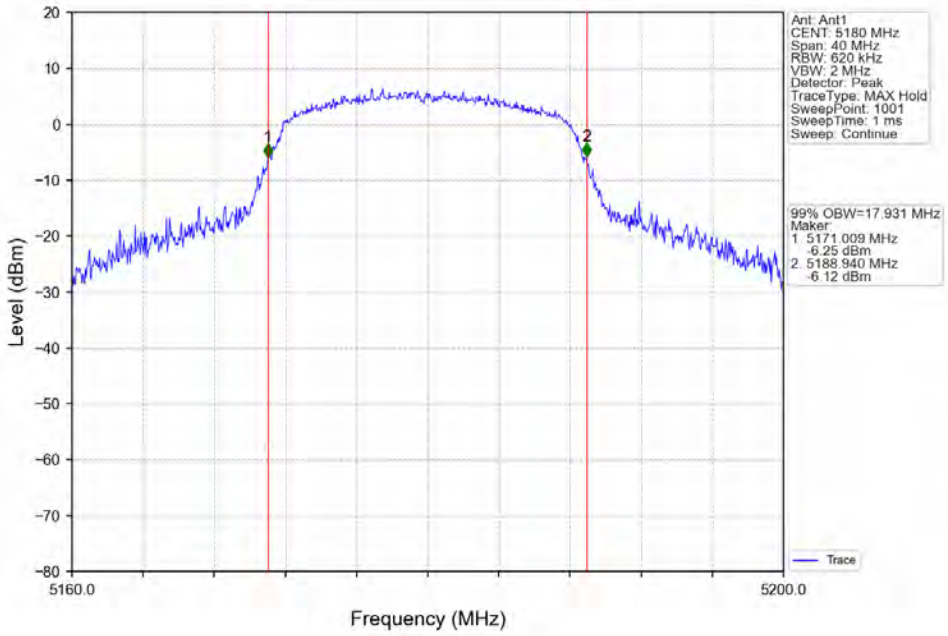
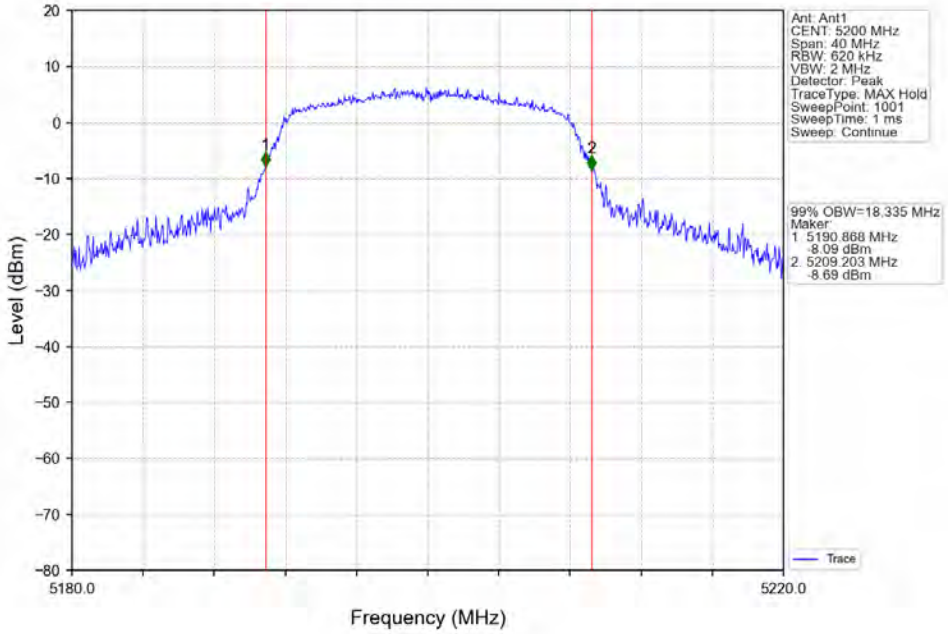
2.1.2 Test Graph

802.11a_LCH_5180MHz_Ant1_NTNV



802.11a_MCH_5200MHz_Ant1_NTNV



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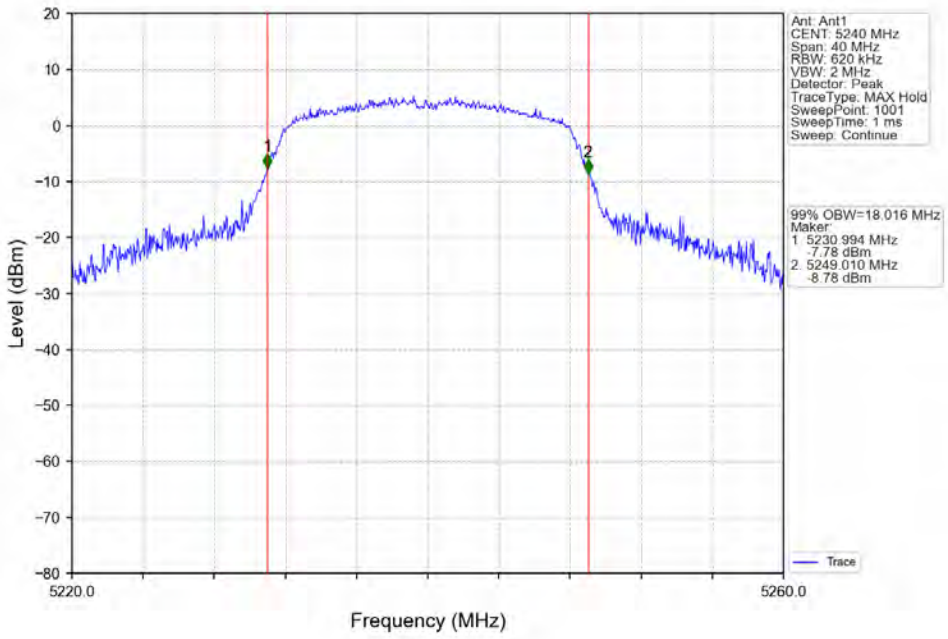
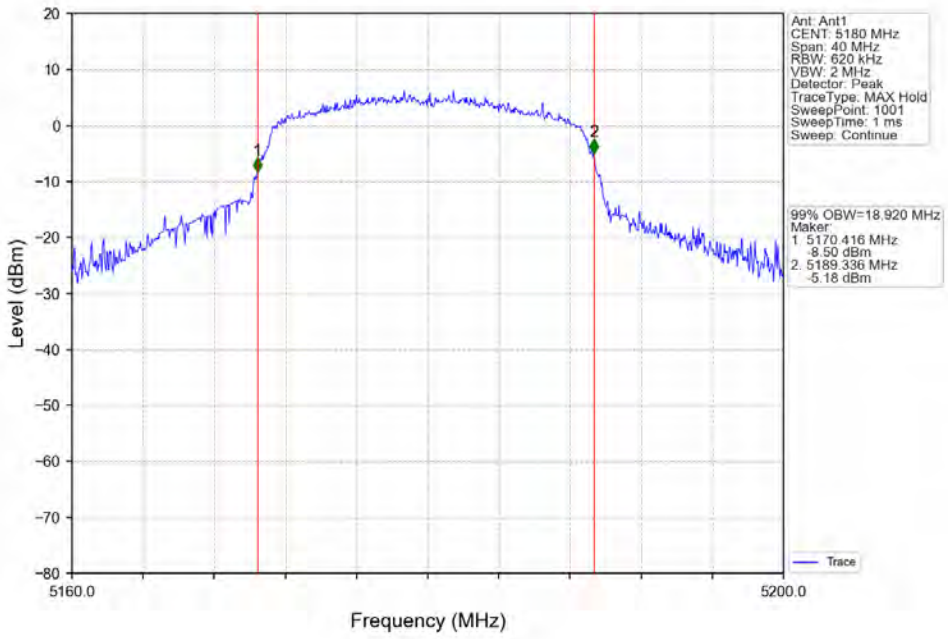
802.11a_HCH_5240MHz_Ant1_NTNV



802.11n(HT20)_LCH_5180MHz_Ant1_NTNV



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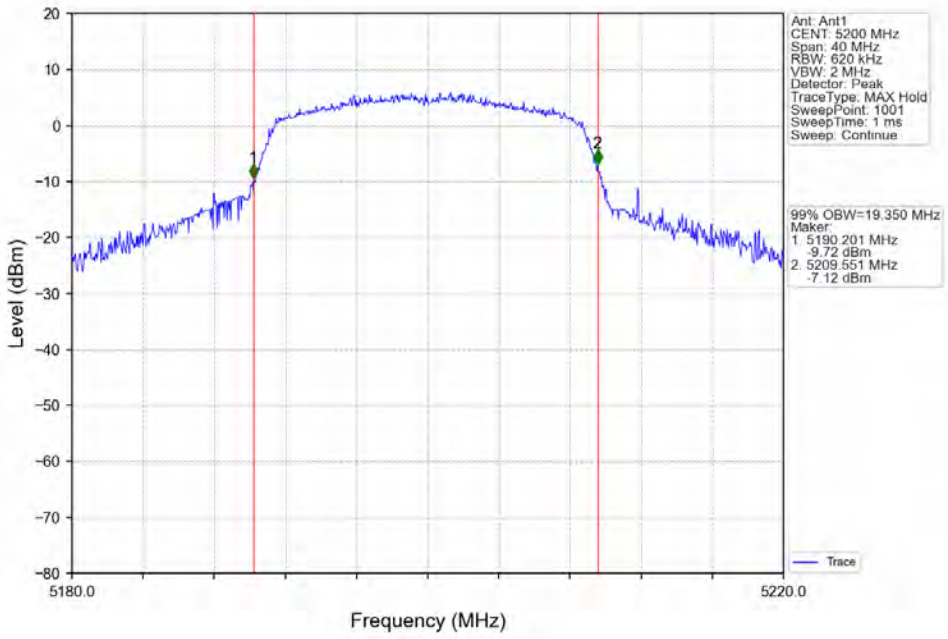
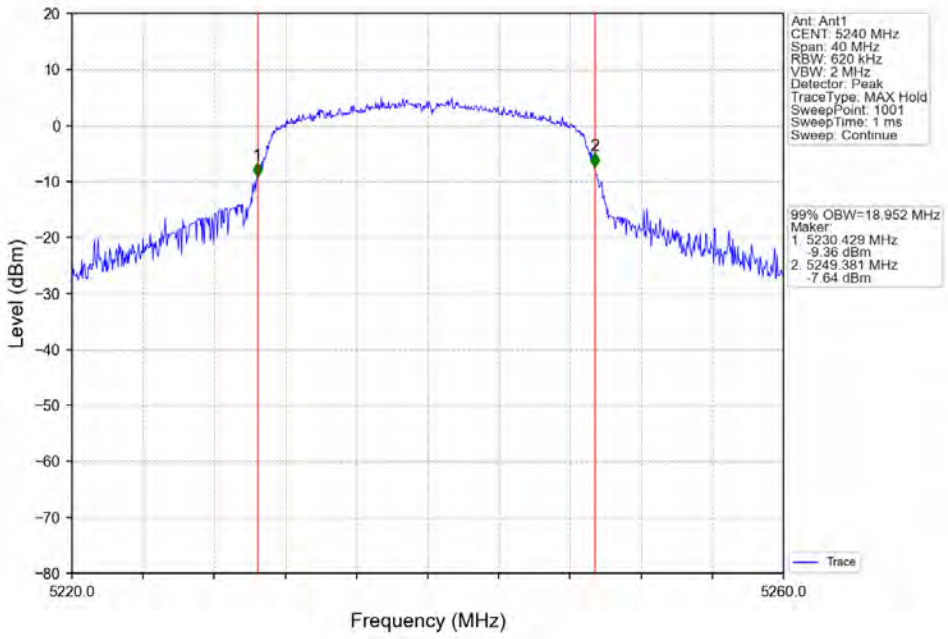
802.11n(HT20)_MCH_5200MHz_Ant1_NTNV



802.11n(HT20)_HCH_5240MHz_Ant1_NTNV



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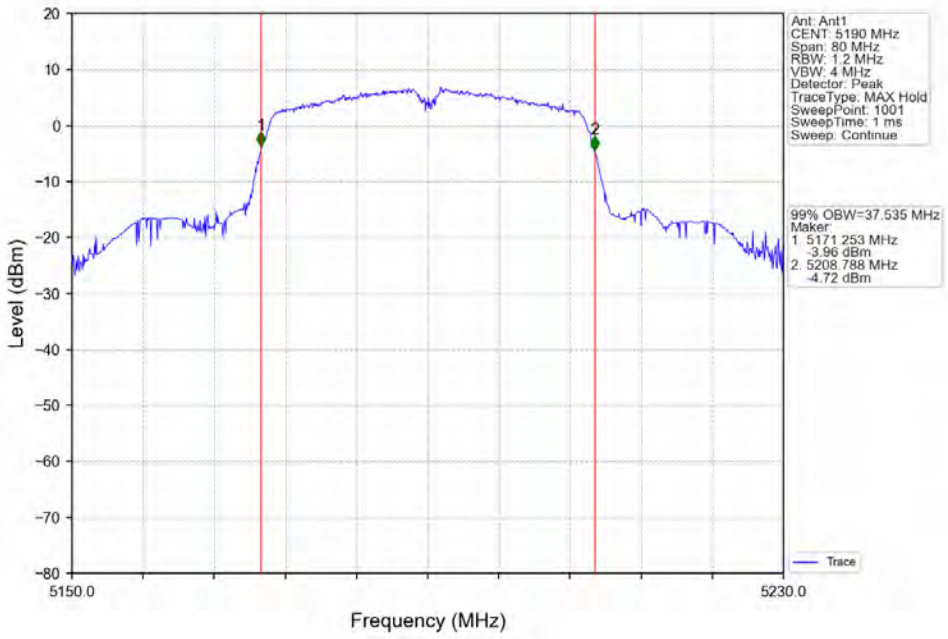
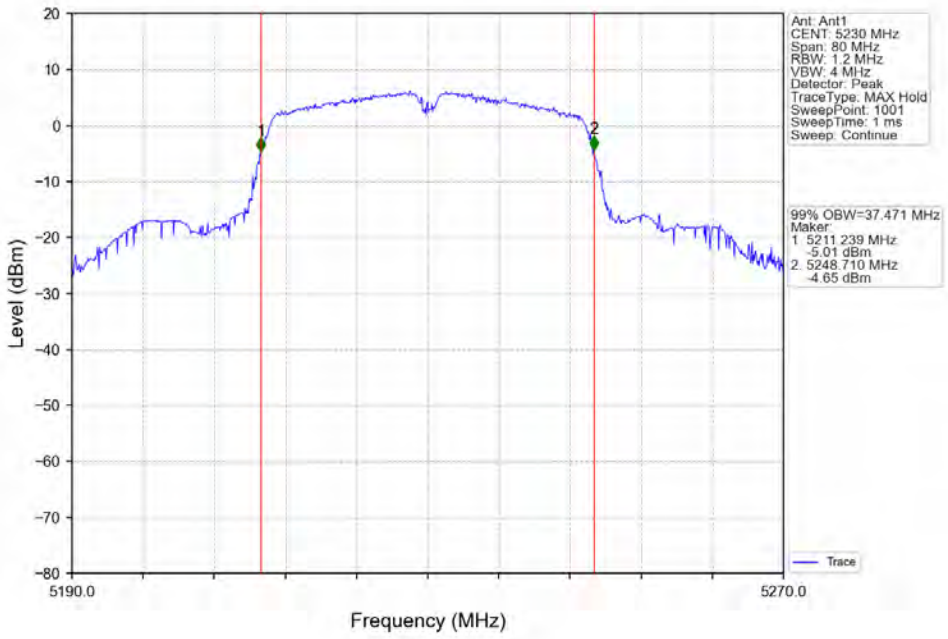
802.11n(HT40)_LCH_5190MHz_Ant1_NTNV



802.11n(HT40)_HCH_5230MHz_Ant1_NTNV



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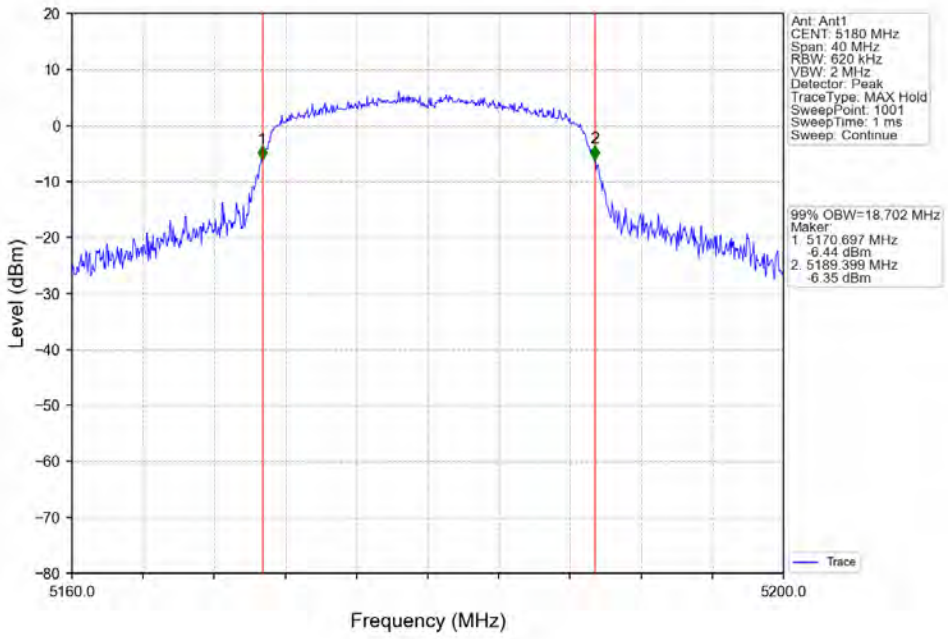
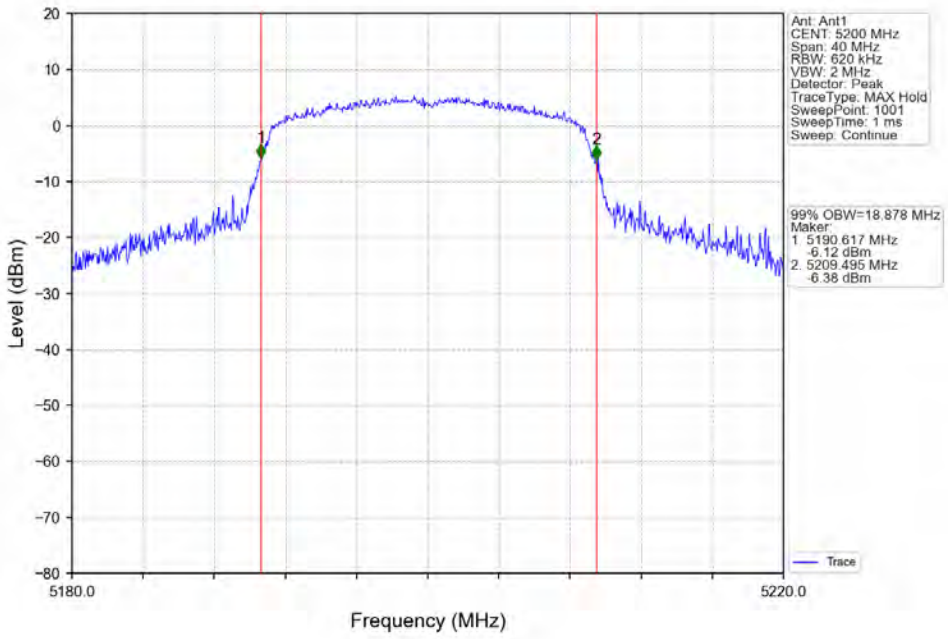
802.11ac(VHT20)_LCH_5180MHz_Ant1_NTNV



802.11ac(VHT20)_MCH_5200MHz_Ant1_NTNV



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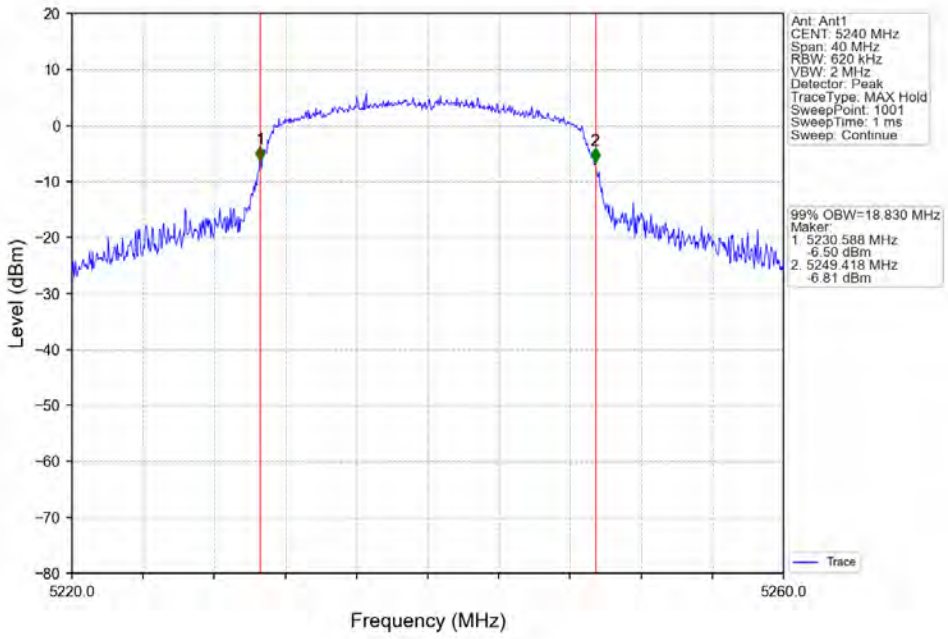
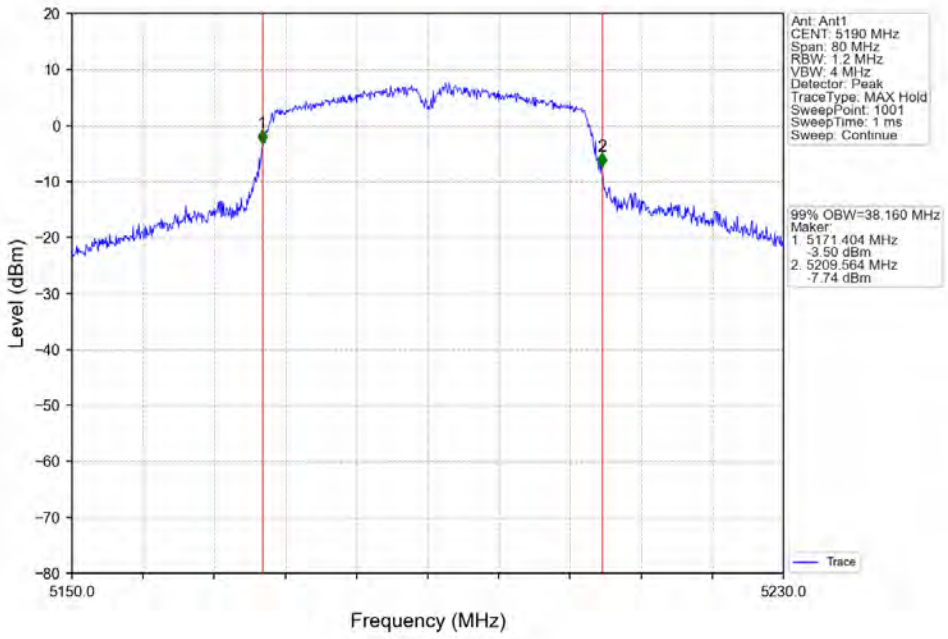
802.11ac(VHT20)_HCH_5240MHz_Ant1_NTNV



802.11ac(VHT40)_LCH_5190MHz_Ant1_NTNV



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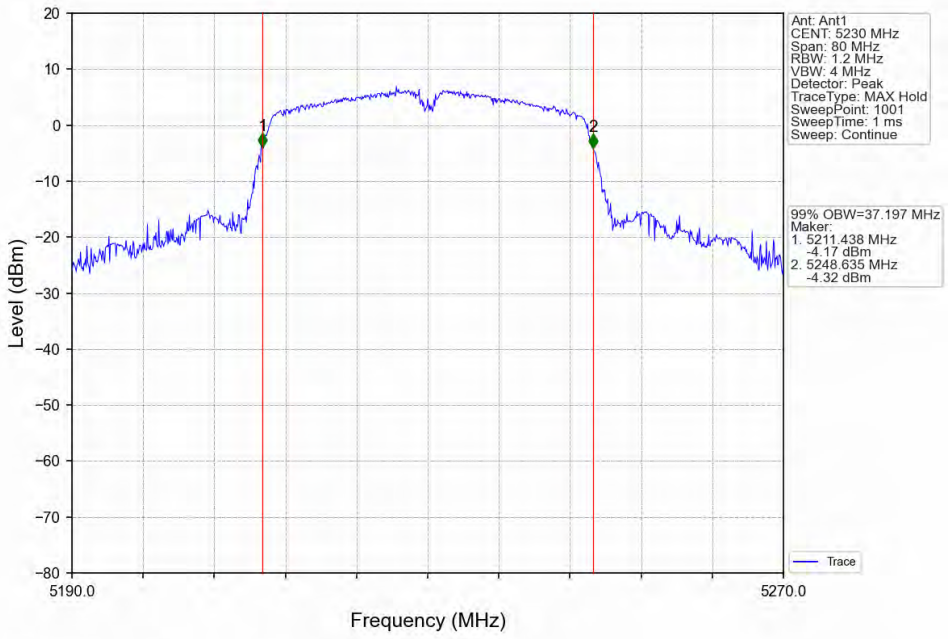
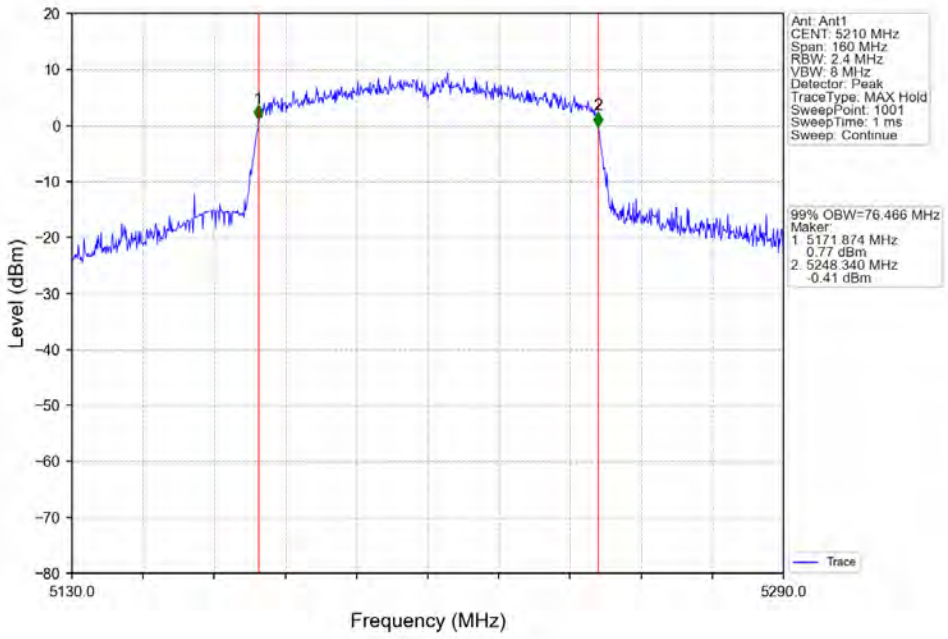
802.11ac(VHT40)_HCH_5230MHz_Ant1_NTNV



802.11ac(VHT80)_MCH_5210MHz_Ant1_NTNV



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2.2 26dB BW

2.2.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	26dB Bandwidth (MHz)		Verdict
				Result	Limit	
802.11a	SISO	5180	1	23.563	/	Pass
		5200	1	25.832	/	Pass
		5240	1	25.310	/	Pass
802.11n (HT20)	SISO	5180	1	25.421	/	Pass
		5200	1	28.150	/	Pass
		5240	1	27.001	/	Pass
802.11n (HT40)	SISO	5190	1	65.311	/	Pass
		5230	1	65.265	/	Pass
802.11ac (VHT20)	SISO	5180	1	24.111	/	Pass
		5200	1	24.968	/	Pass
		5240	1	26.236	/	Pass
802.11ac (VHT40)	SISO	5190	1	74.542	/	Pass
		5230	1	50.656	/	Pass
802.11ac (VHT80)	SISO	5210	1	147.587	/	Pass

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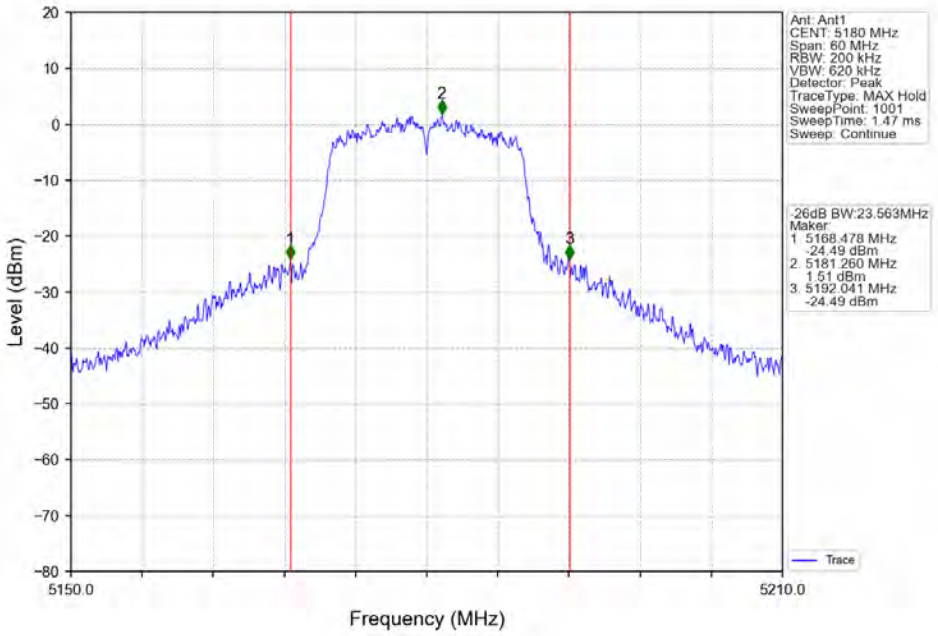
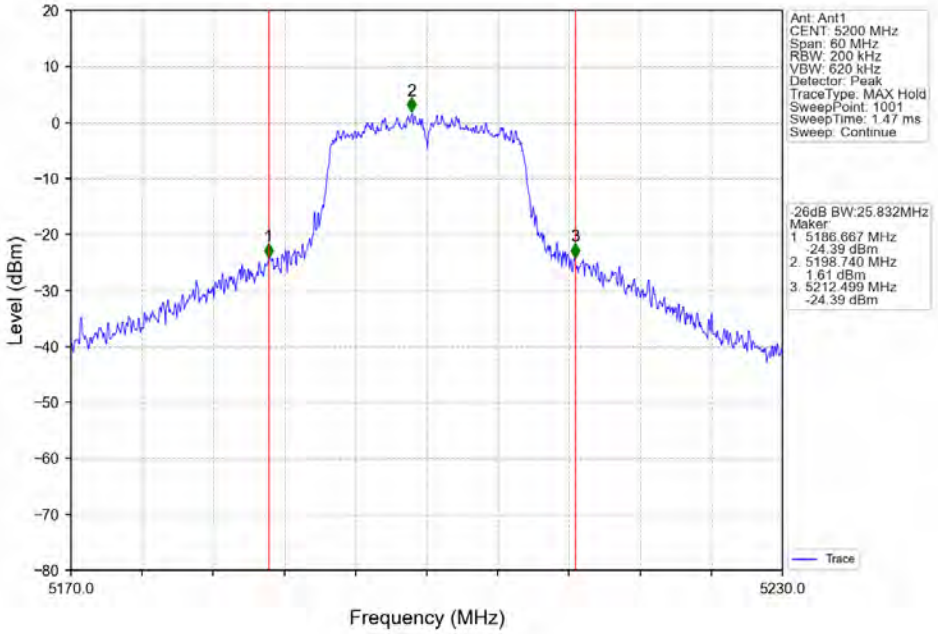
2.2.2 Test Graph

802.11a_LCH_5180MHz_Ant1_NTNV



802.11a_MCH_5200MHz_Ant1_NTNV



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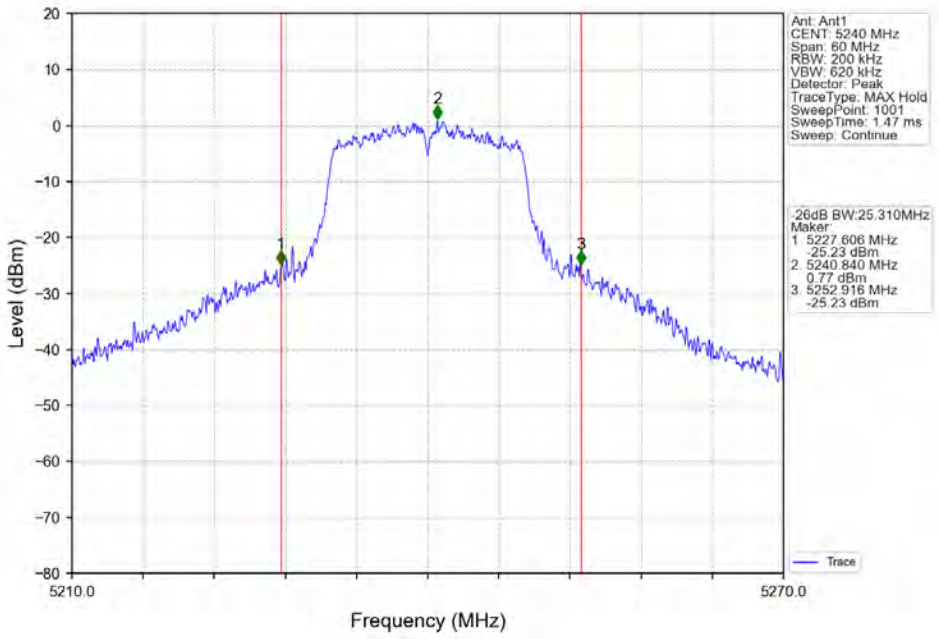
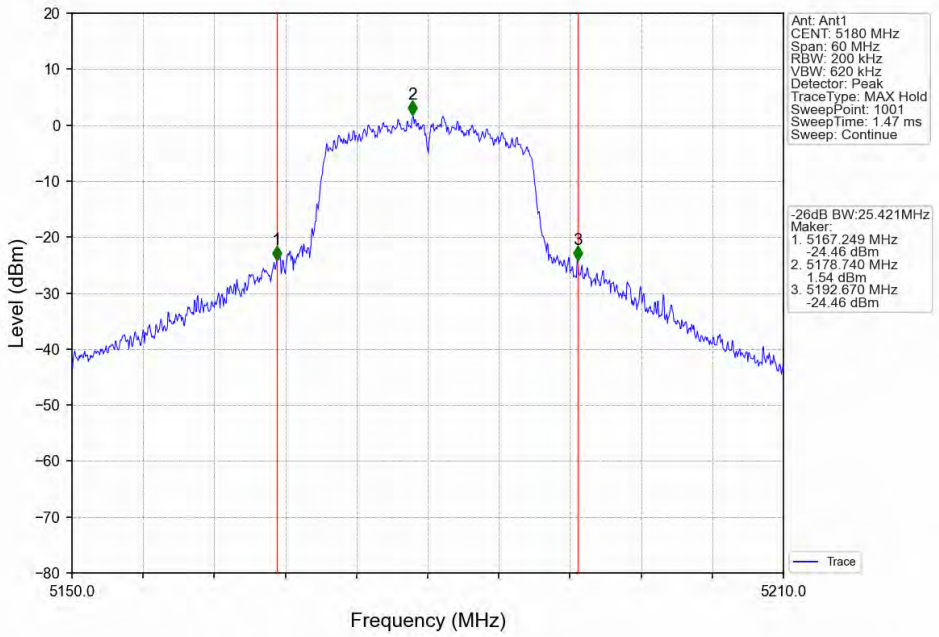
802.11a_HCH_5240MHz_Ant1_NTNV



802.11n(HT20)_LCH_5180MHz_Ant1_NTNV



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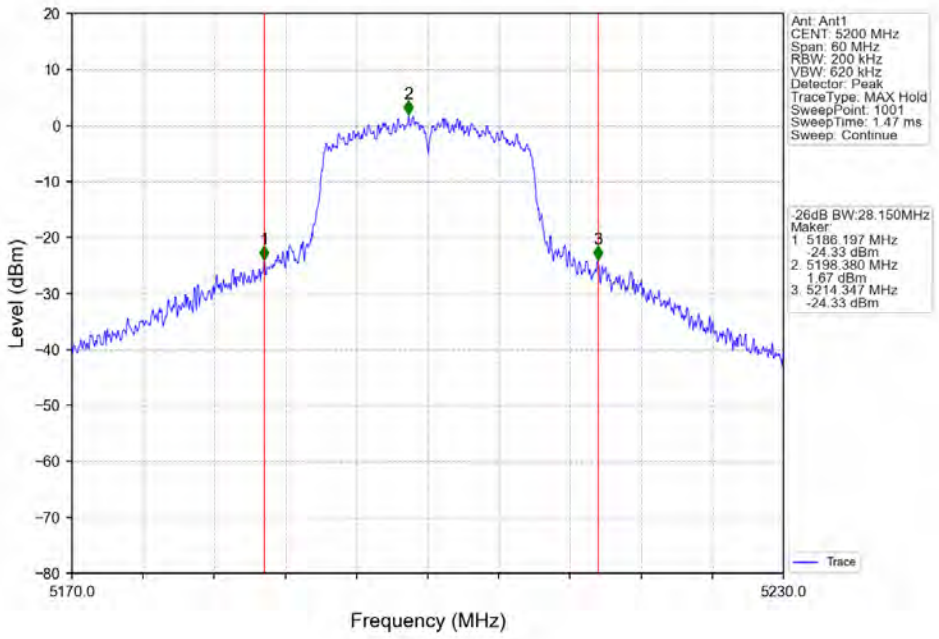
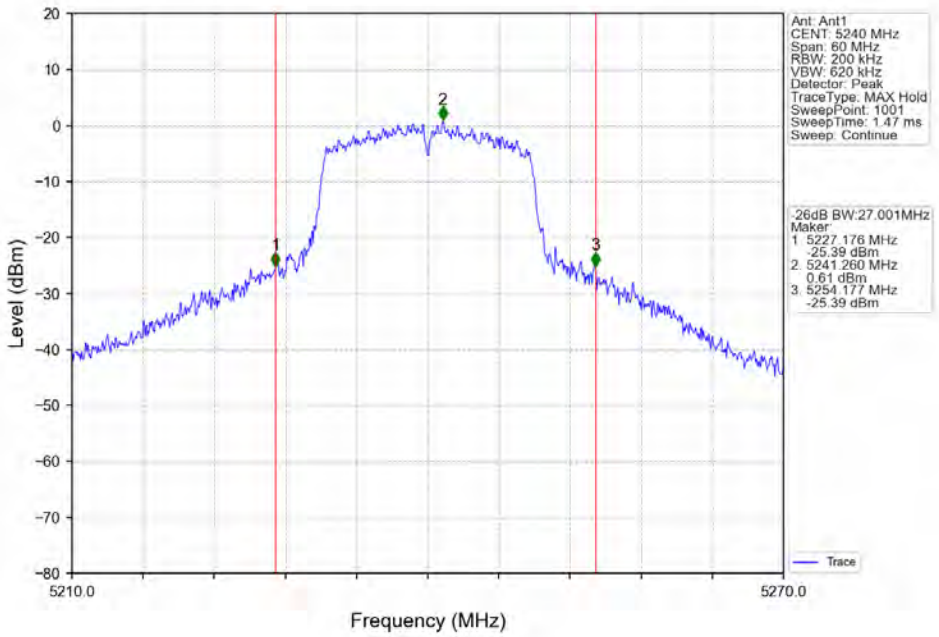
802.11n(HT20)_MCH_5200MHz_Ant1_NTNV



802.11n(HT20)_HCH_5240MHz_Ant1_NTNV



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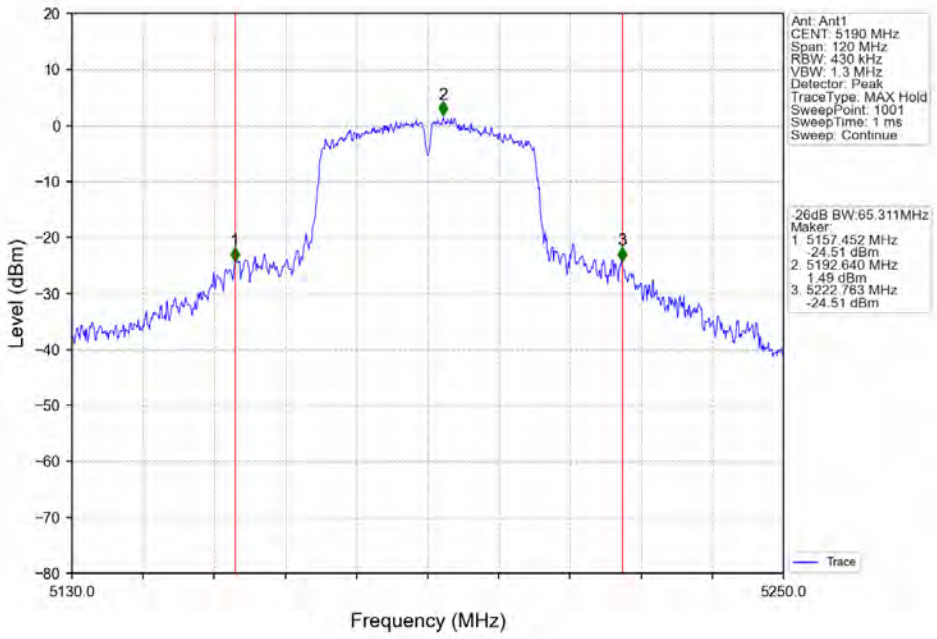
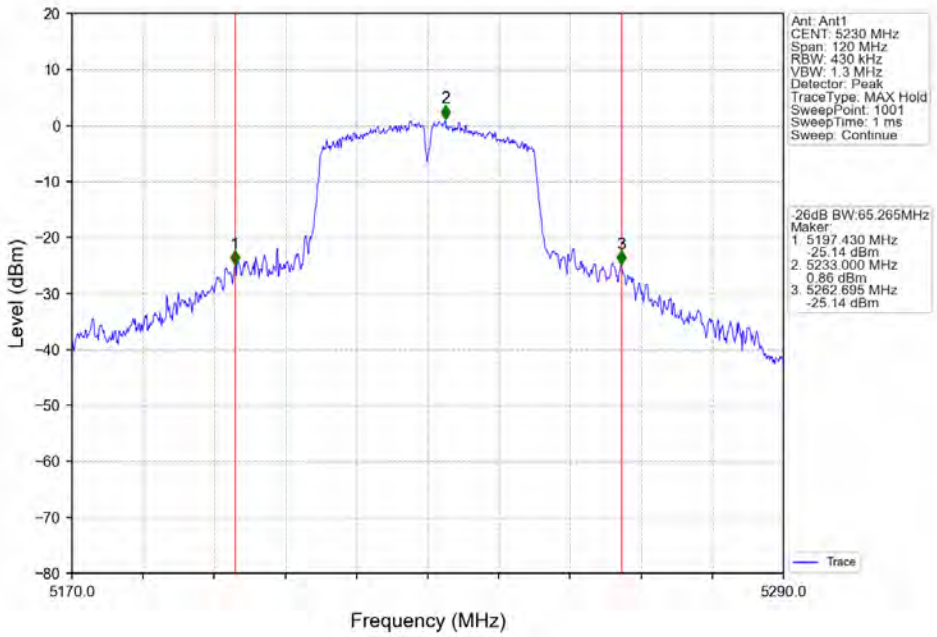
802.11n(HT40)_LCH_5190MHz_Ant1_NTNV



802.11n(HT40)_HCH_5230MHz_Ant1_NTNV



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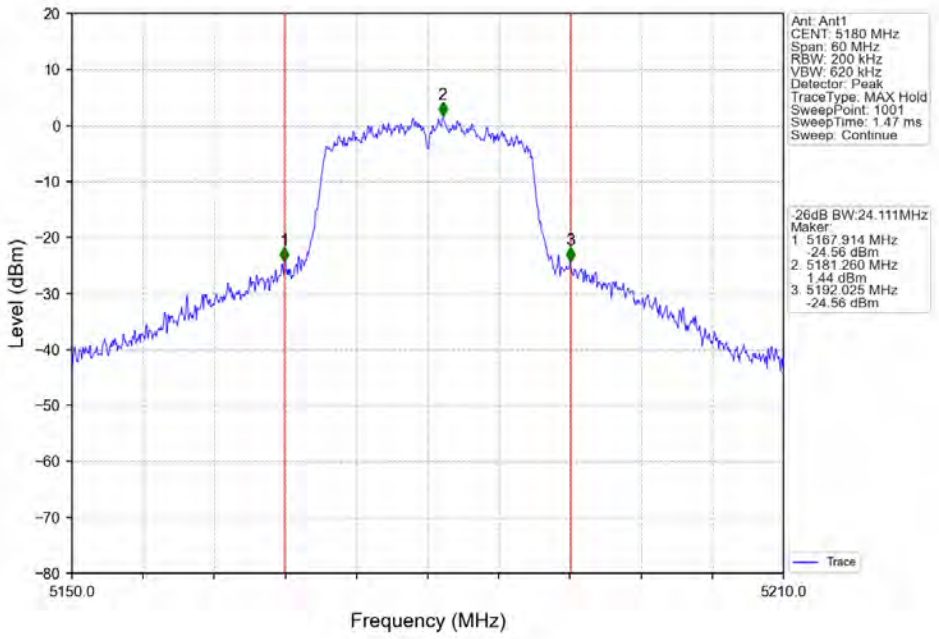
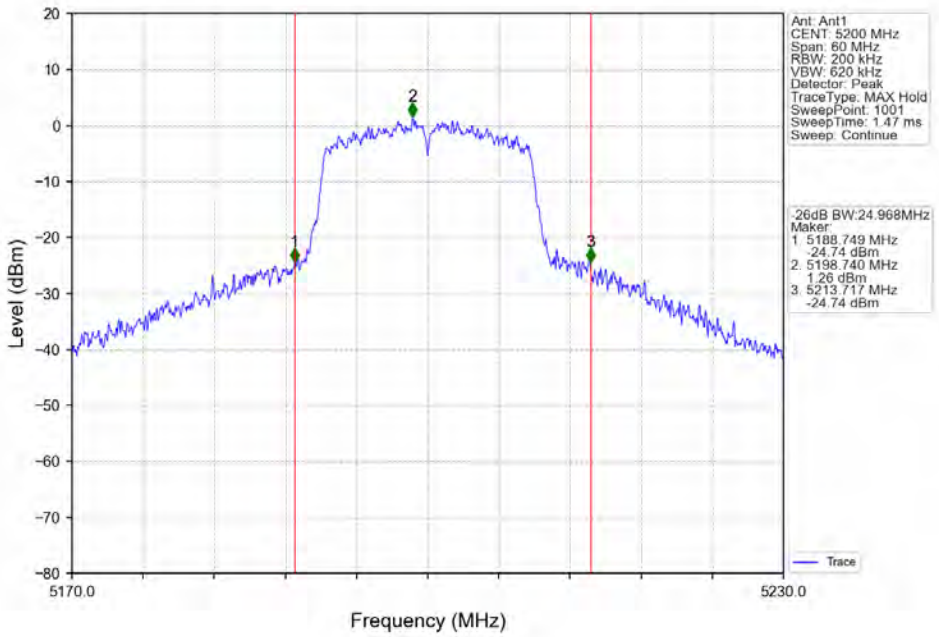
802.11ac(VHT20)_LCH_5180MHz_Ant1_NTNV



802.11ac(VHT20)_MCH_5200MHz_Ant1_NTNV



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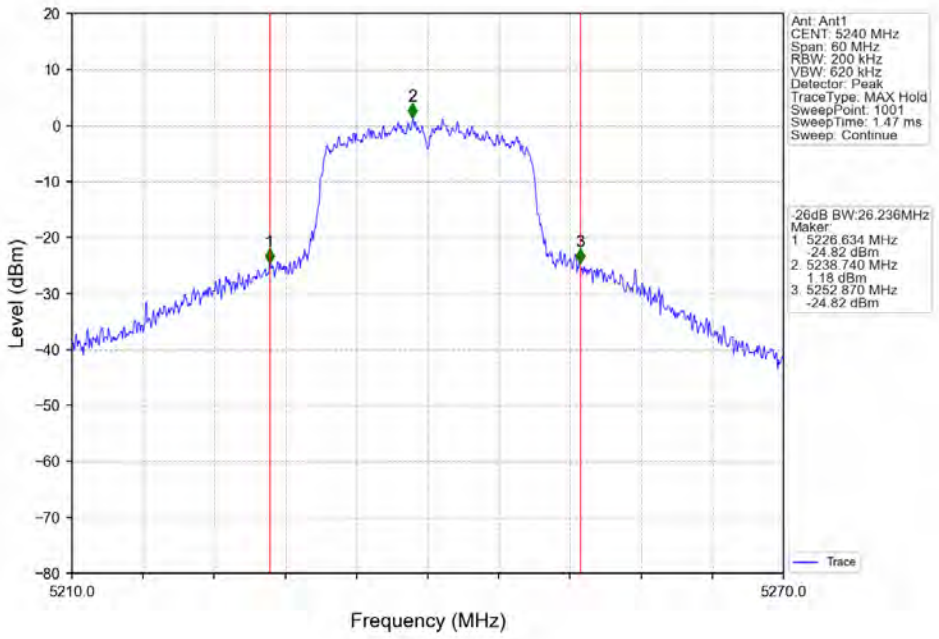
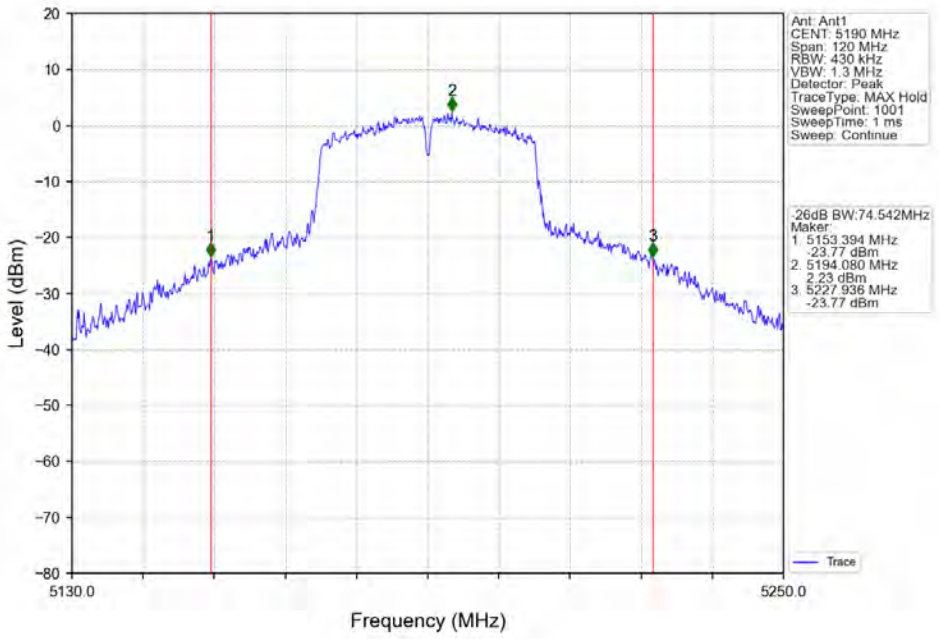
802.11ac(VHT20)_HCH_5240MHz_Ant1_NTNV



802.11ac(VHT40)_LCH_5190MHz_Ant1_NTNV



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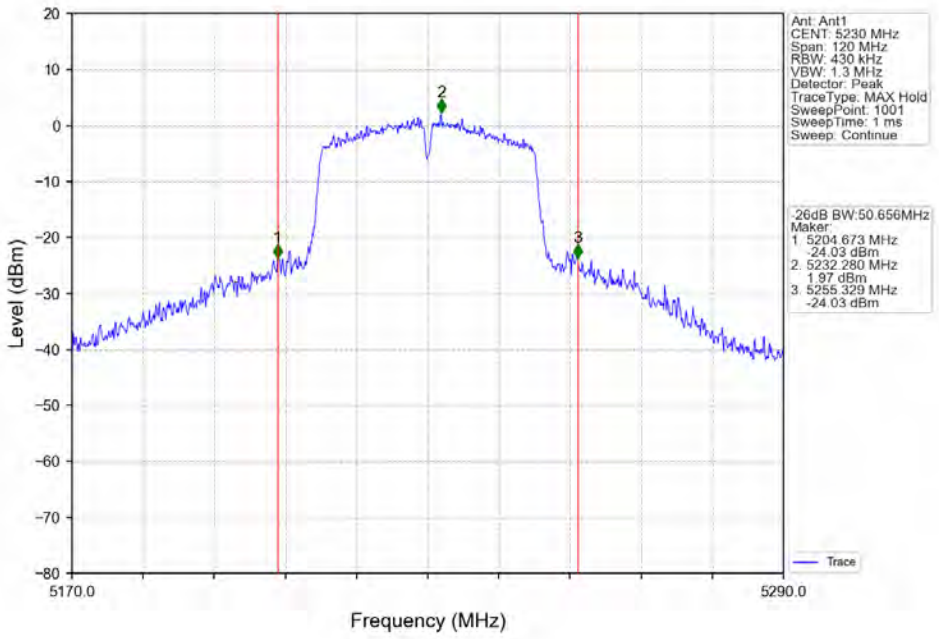
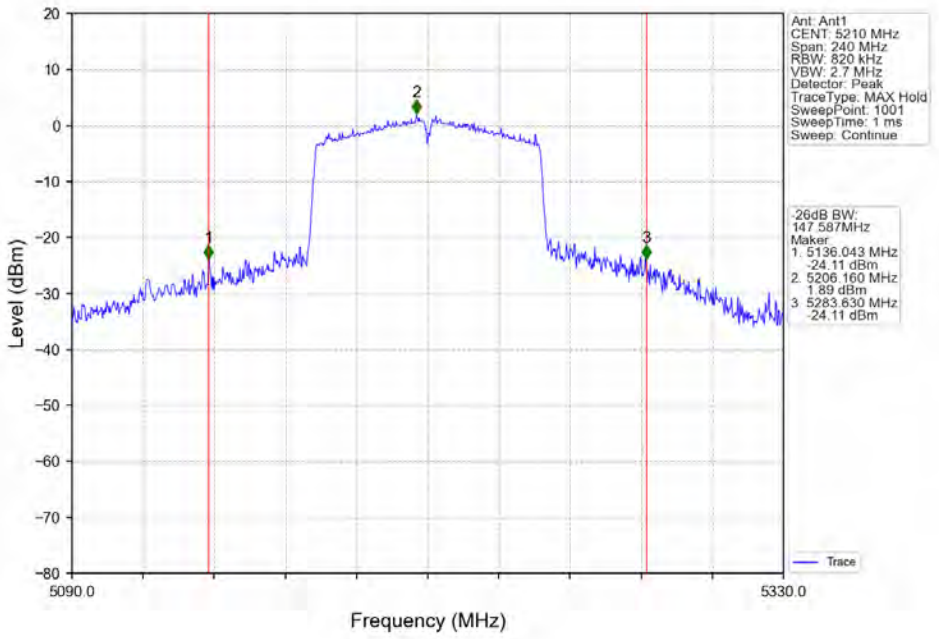
802.11ac(VHT40)_HCH_5230MHz_Ant1_NTNV



802.11ac(VHT80)_MCH_5210MHz_Ant1_NTNV



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3. Maximum Conducted Output Power

3.1 Power

3.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Maximum Average Conducted Output Power (dBm)		Verdict
			ANT1	Limit	
802.11a	SISO	5180	10.45	<=23.98	Pass
		5200	10.80	<=23.98	Pass
		5240	9.78	<=23.98	Pass
802.11n (HT20)	SISO	5180	10.39	<=23.98	Pass
		5200	10.69	<=23.98	Pass
		5240	9.64	<=23.98	Pass
802.11n (HT40)	SISO	5190	10.40	<=23.98	Pass
		5230	9.97	<=23.98	Pass
802.11ac (VHT20)	SISO	5180	10.43	<=23.98	Pass
		5200	10.38	<=23.98	Pass
		5240	10.06	<=23.98	Pass
802.11ac (VHT40)	SISO	5190	11.13	<=23.98	Pass
		5230	10.40	<=23.98	Pass
802.11ac (VHT80)	SISO	5210	10.87	<=23.98	Pass
Note1: Antenna Gain: Ant1: 0.11dBi;					

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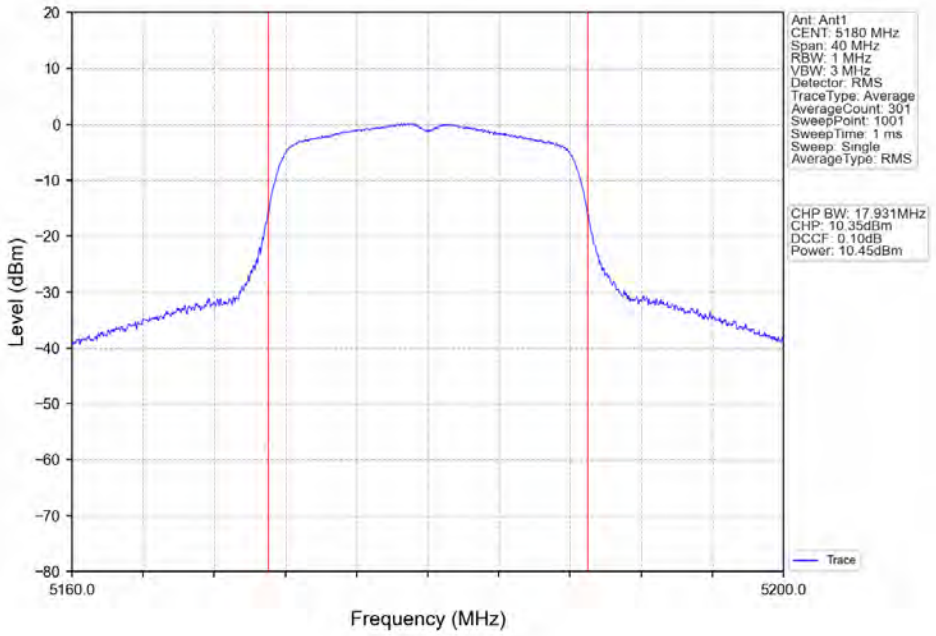
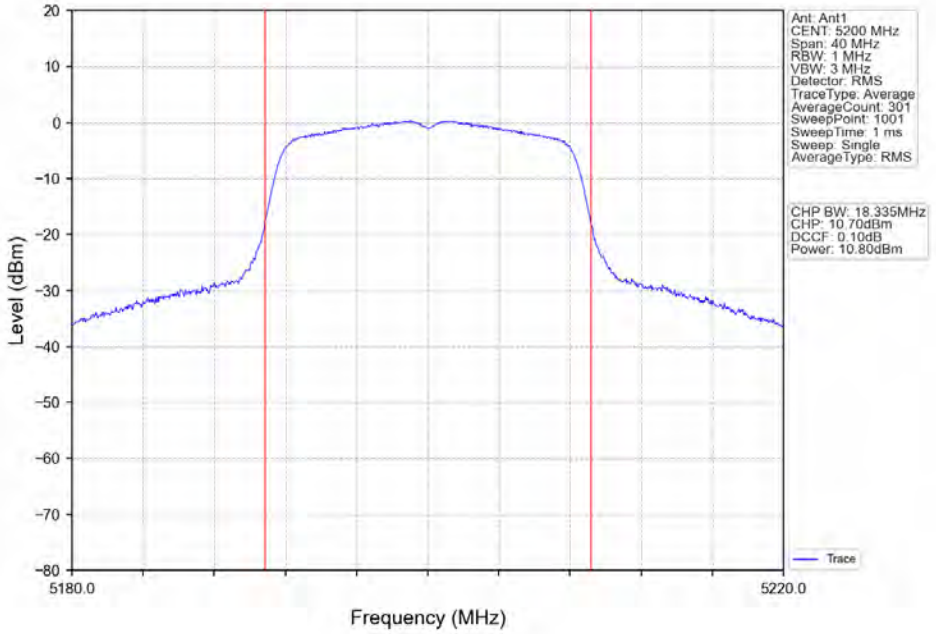
3.1.2 Test Graph

802.11a_LCH_5180MHz_Ant1_NTNV



802.11a_MCH_5200MHz_Ant1_NTNV



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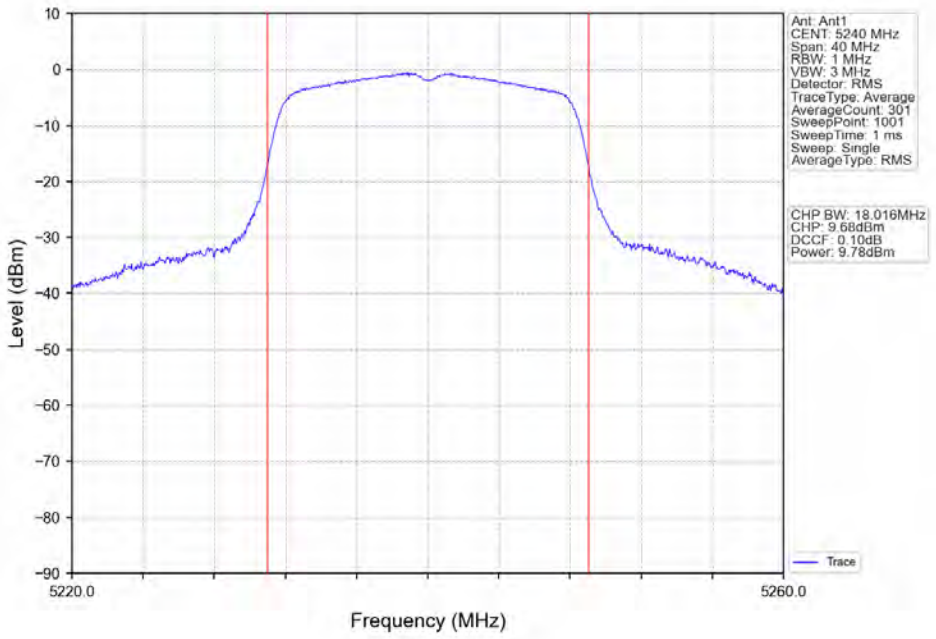
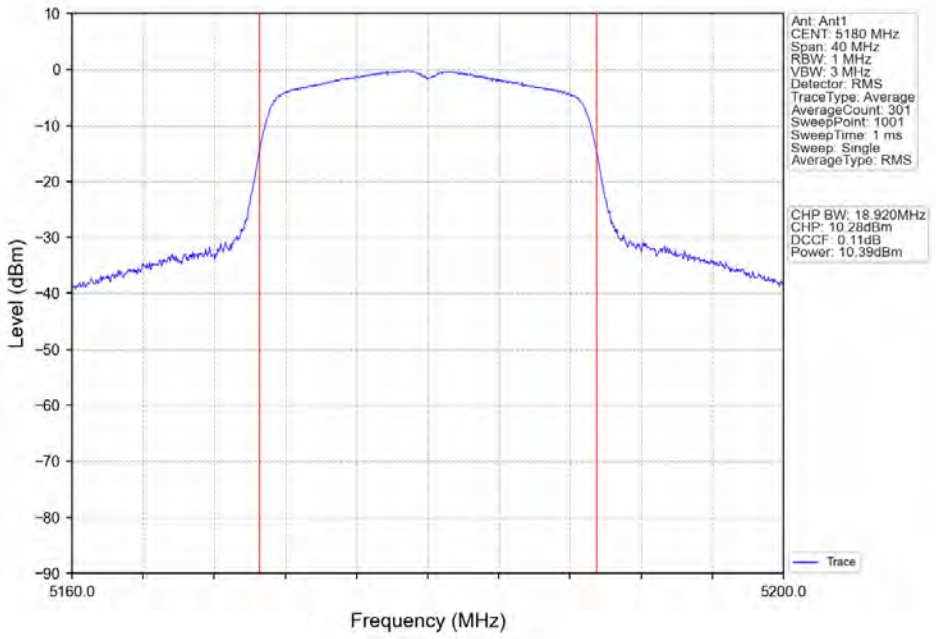
802.11a_HCH_5240MHz_Ant1_NTNV



802.11n(HT20)_LCH_5180MHz_Ant1_NTNV



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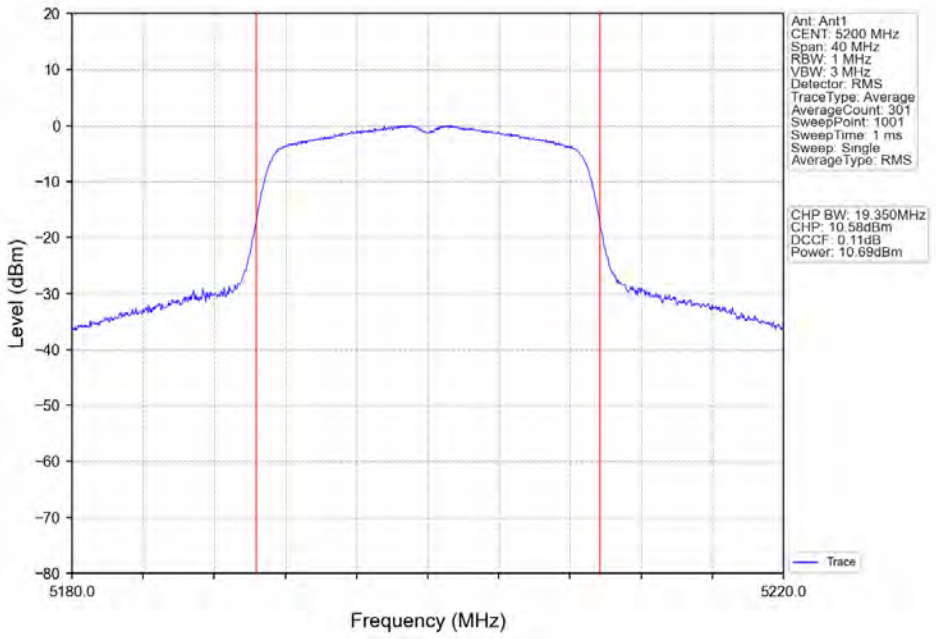
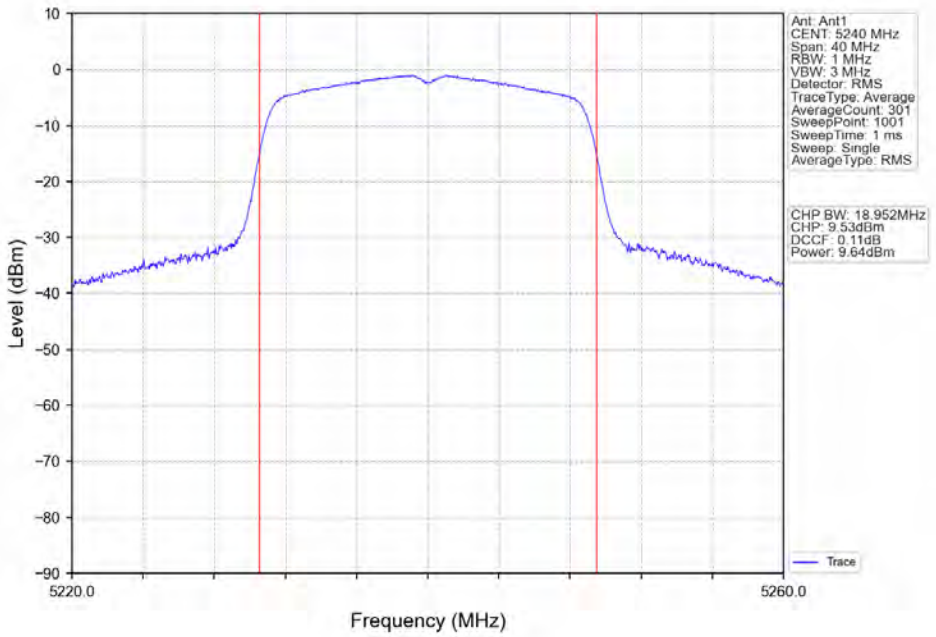
802.11n(HT20)_MCH_5200MHz_Ant1_NTNV



802.11n(HT20)_HCH_5240MHz_Ant1_NTNV



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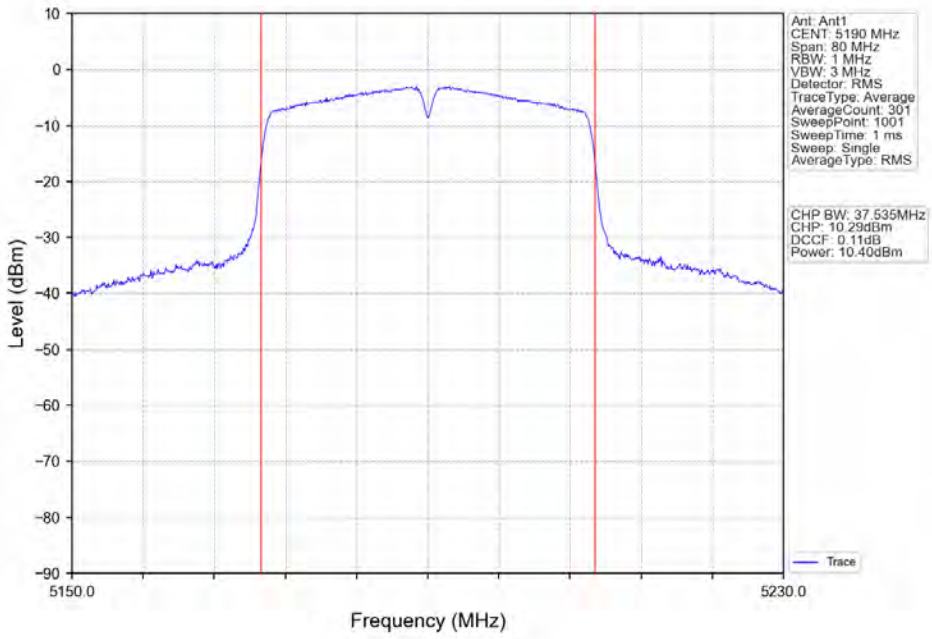
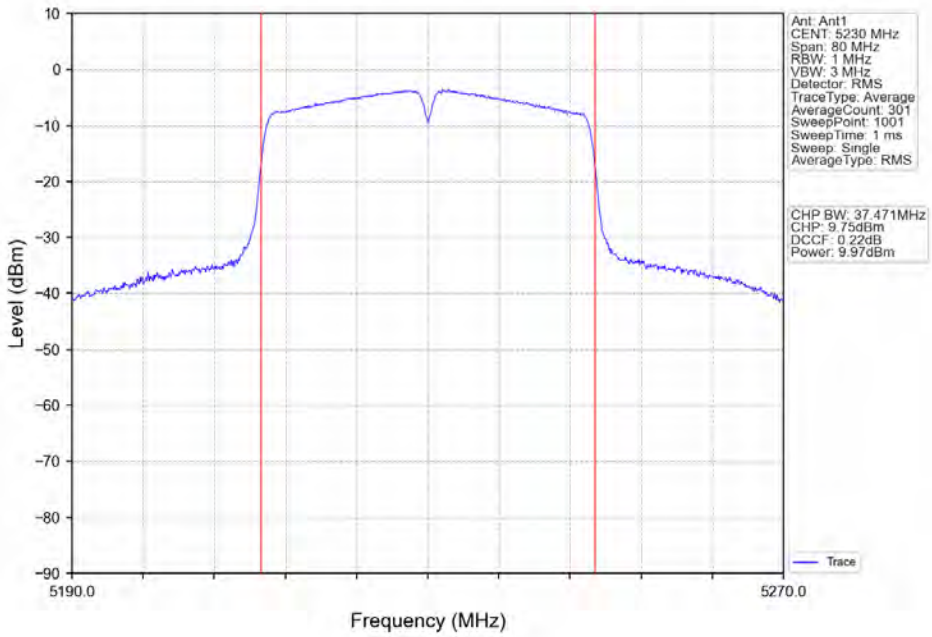
802.11n(HT40)_LCH_5190MHz_Ant1_NTNV



802.11n(HT40)_HCH_5230MHz_Ant1_NTNV



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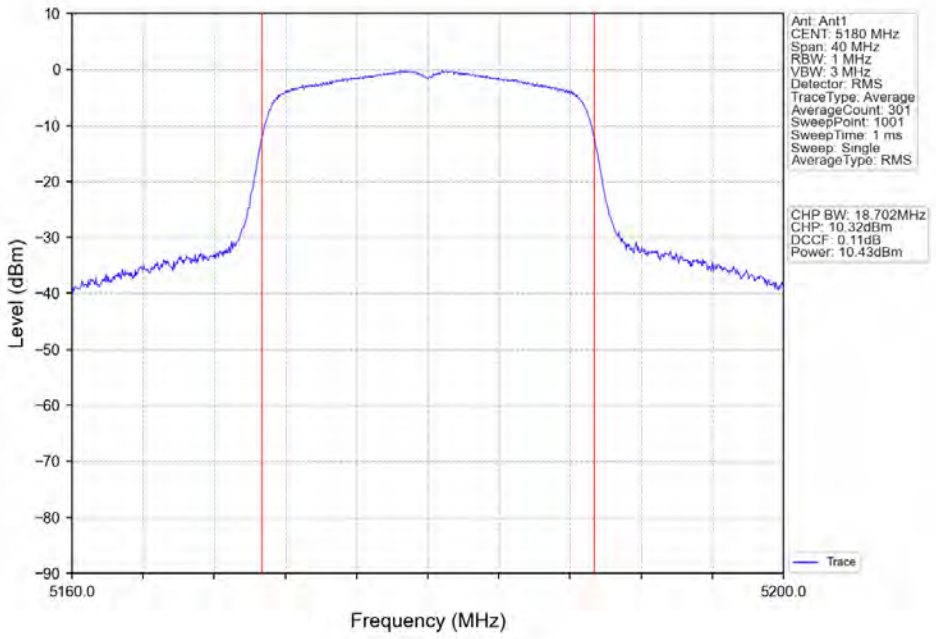
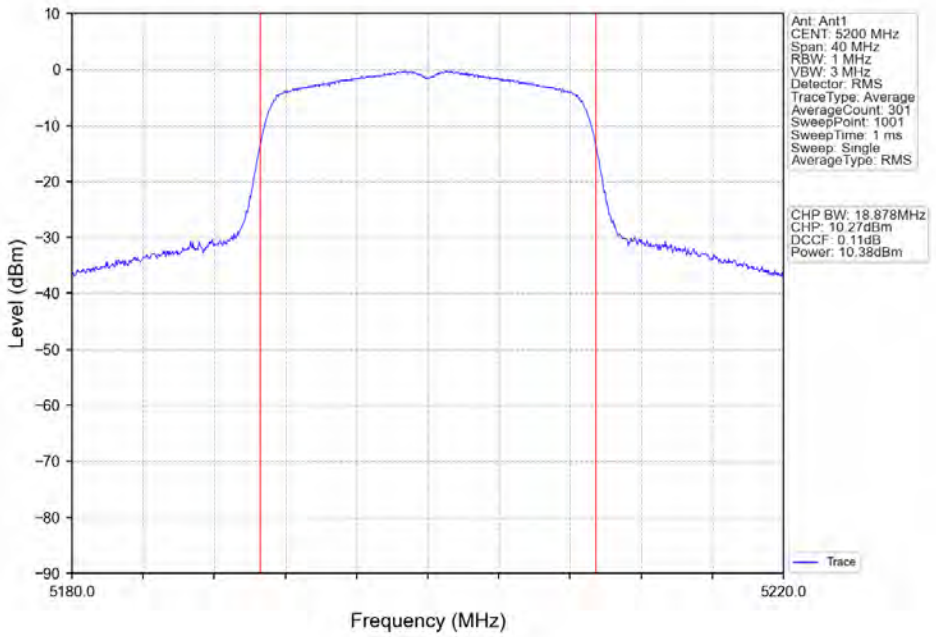
802.11ac(VHT20)_LCH_5180MHz_Ant1_NTNV



802.11ac(VHT20)_MCH_5200MHz_Ant1_NTNV



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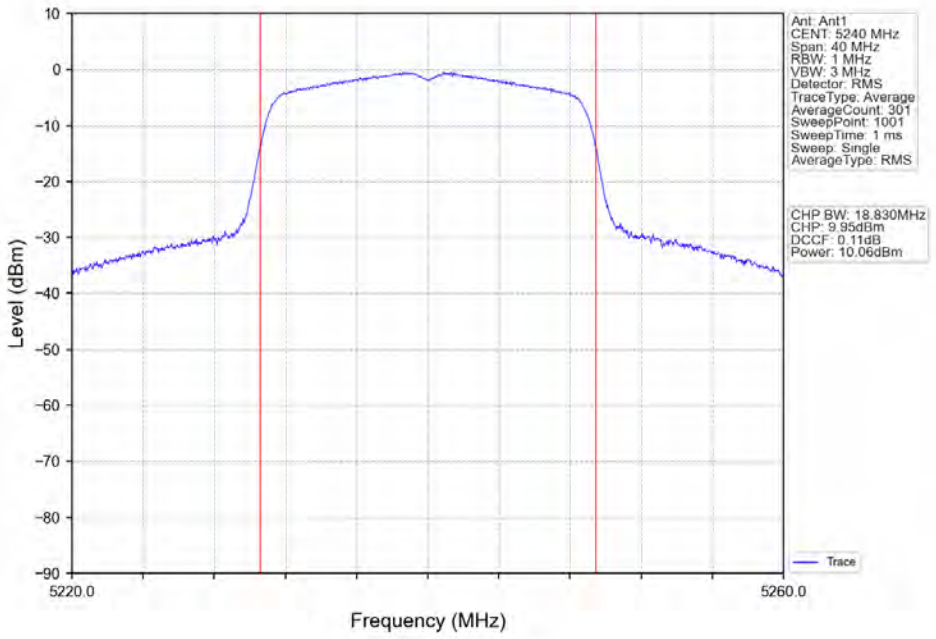
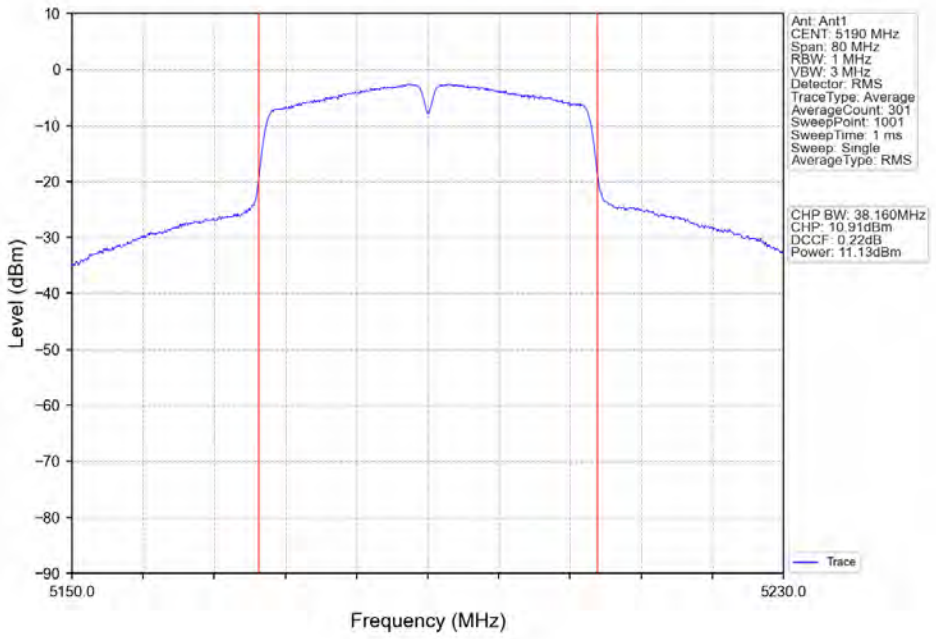
802.11ac(VHT20)_HCH_5240MHz_Ant1_NTNV



802.11ac(VHT40)_LCH_5190MHz_Ant1_NTNV



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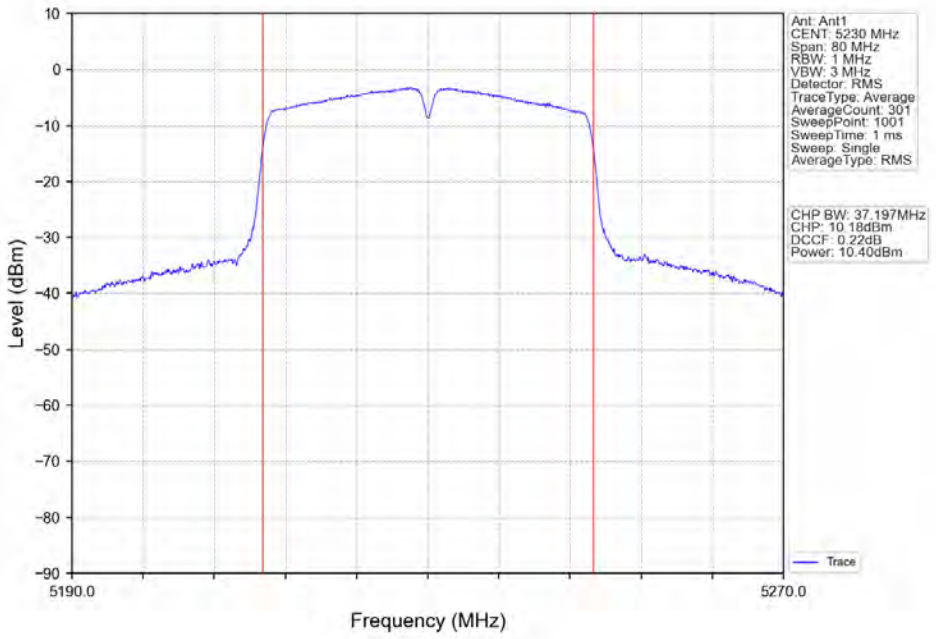
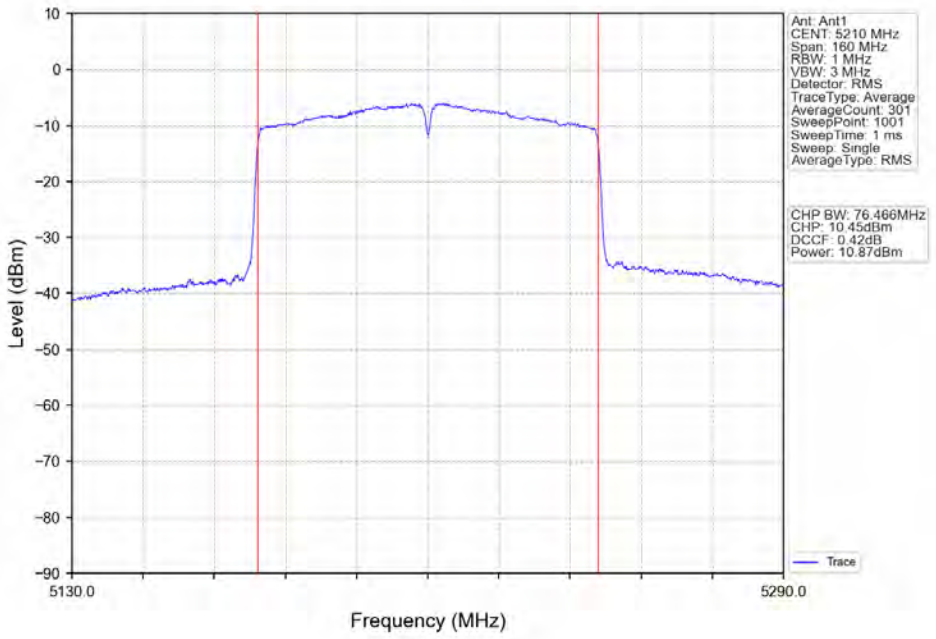
802.11ac(VHT40)_HCH_5230MHz_Ant1_NTNV



802.11ac(VHT80)_MCH_5210MHz_Ant1_NTNV



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4. Maximum Power Spectral Density

4.1 PSD

4.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm/MHz)		Verdict
			ANT1	Limit	
802.11a	SISO	5180	0.35	<=11	Pass
		5200	0.16	<=11	Pass
		5240	-0.38	<=11	Pass
802.11n (HT20)	SISO	5180	0.23	<=11	Pass
		5200	0.13	<=11	Pass
		5240	-0.59	<=11	Pass
802.11n (HT40)	SISO	5190	-2.66	<=11	Pass
		5230	-3.29	<=11	Pass
802.11ac (VHT20)	SISO	5180	0.36	<=11	Pass
		5200	-0.10	<=11	Pass
		5240	-0.29	<=11	Pass
802.11ac (VHT40)	SISO	5190	-2.43	<=11	Pass
		5230	-3.27	<=11	Pass
802.11ac (VHT80)	SISO	5210	-5.56	<=11	Pass
Note1: Antenna Gain: Ant1: 0.11dBi;					

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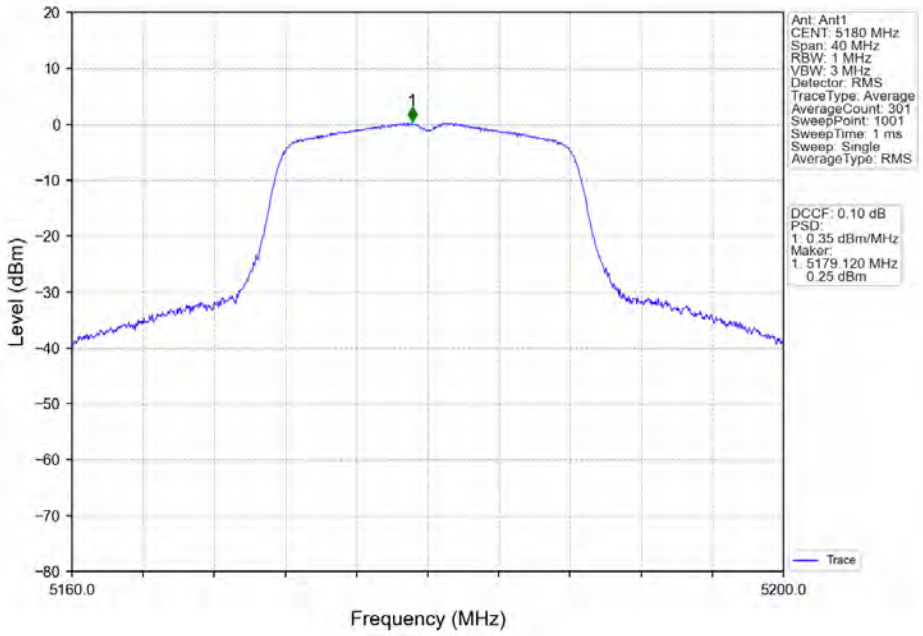
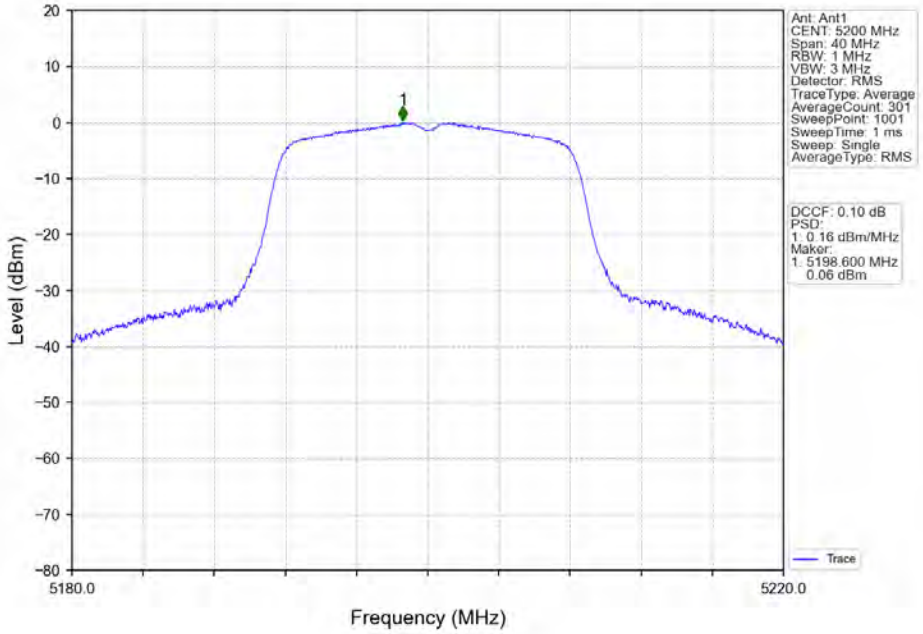
4.1.2 Test Graph

802.11a_LCH_5180MHz_Ant1_NTNV



802.11a_MCH_5200MHz_Ant1_NTNV



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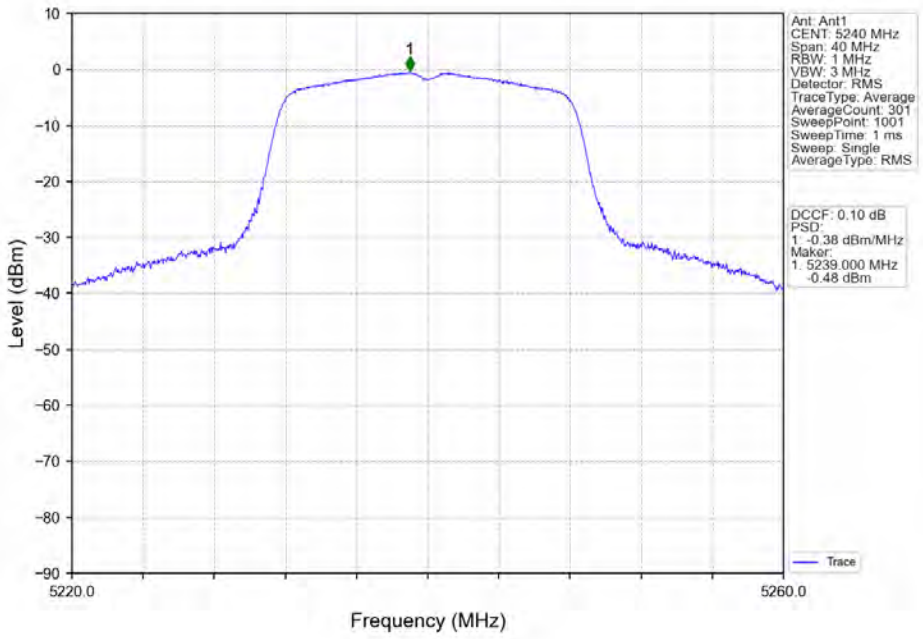
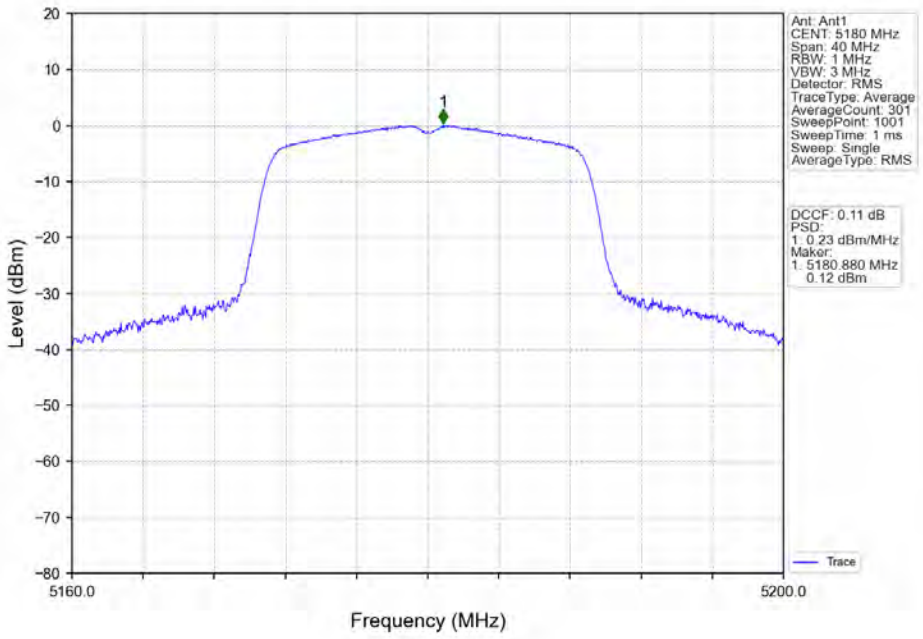
802.11a_HCH_5240MHz_Ant1_NTNV



802.11n(HT20)_LCH_5180MHz_Ant1_NTNV



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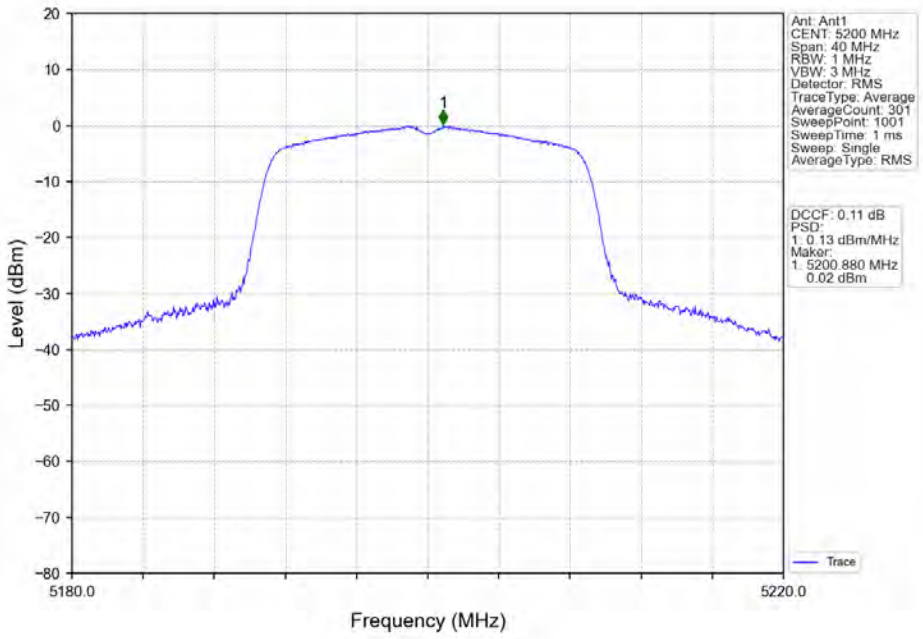
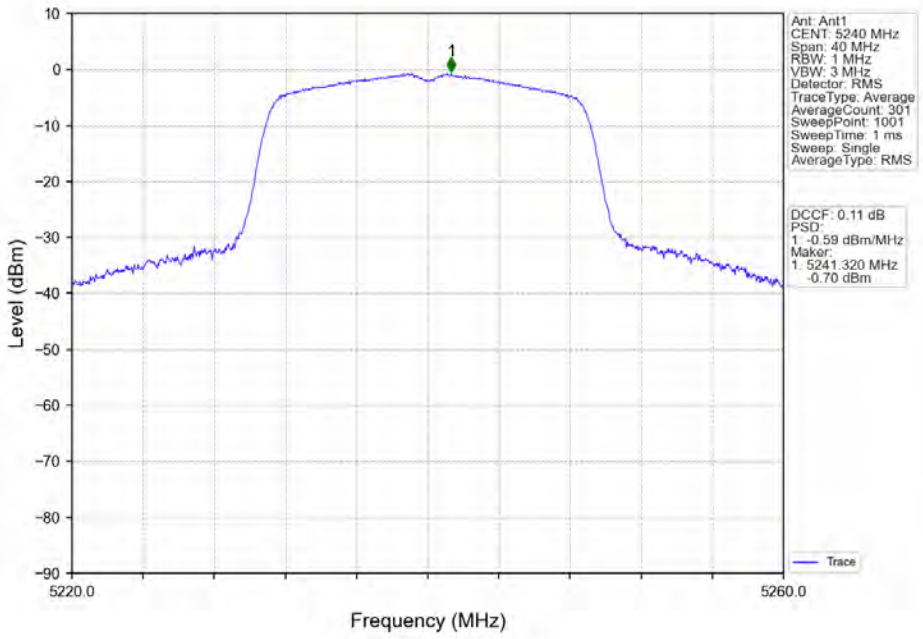
802.11n(HT20)_MCH_5200MHz_Ant1_NTNV



802.11n(HT20)_HCH_5240MHz_Ant1_NTNV



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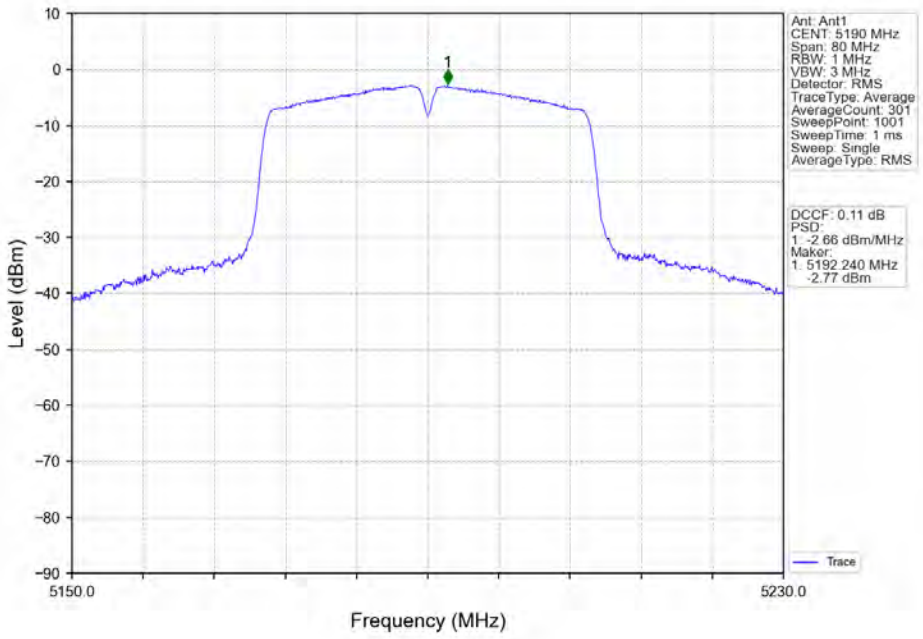
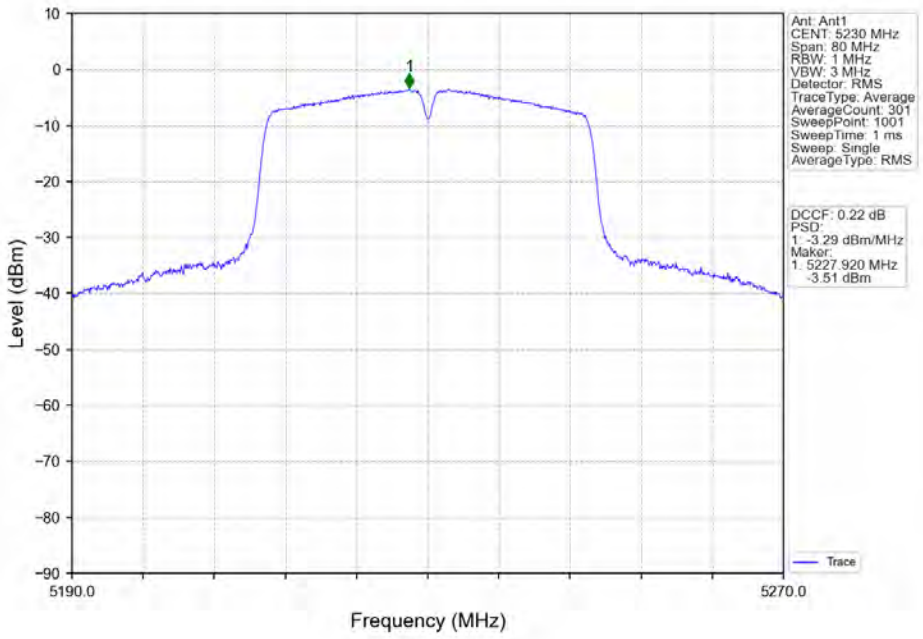
802.11n(HT40)_LCH_5190MHz_Ant1_NTNV



802.11n(HT40)_HCH_5230MHz_Ant1_NTNV



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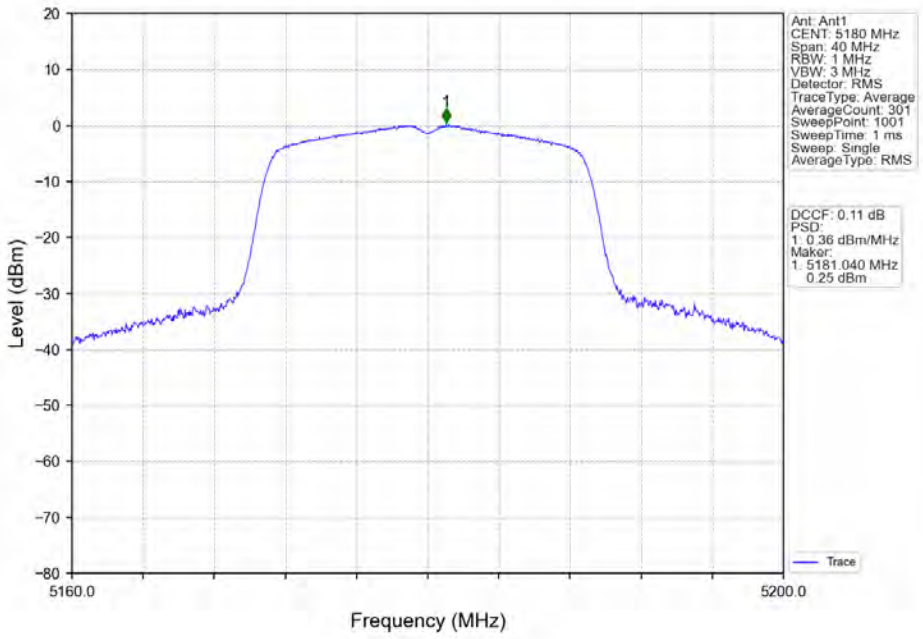
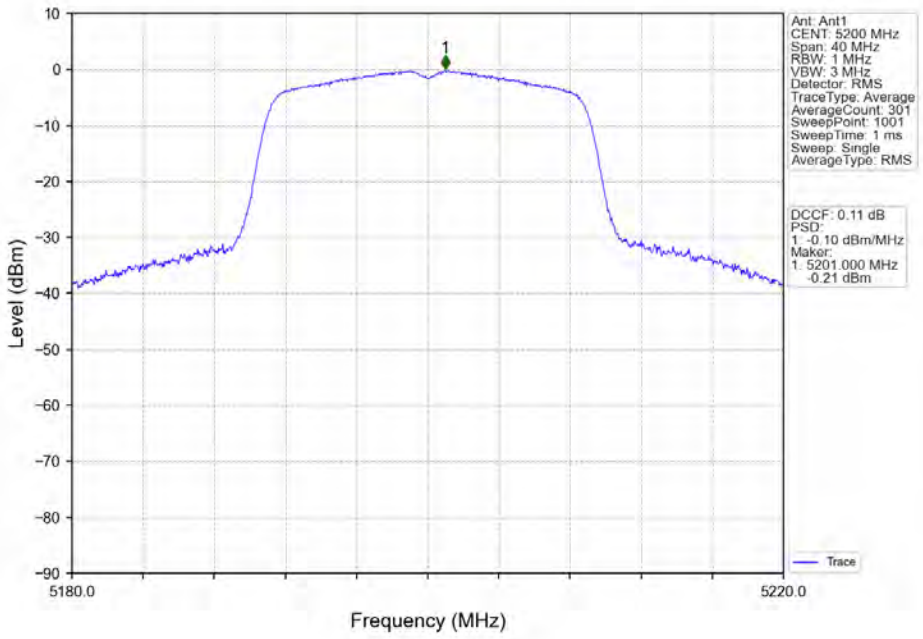
802.11ac(VHT20)_LCH_5180MHz_Ant1_NTNV



802.11ac(VHT20)_MCH_5200MHz_Ant1_NTNV



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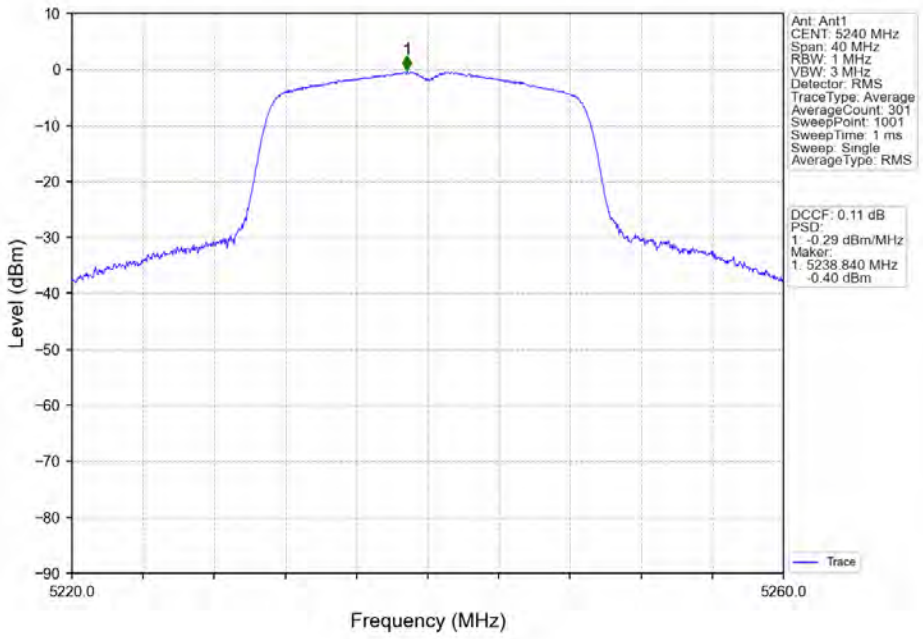
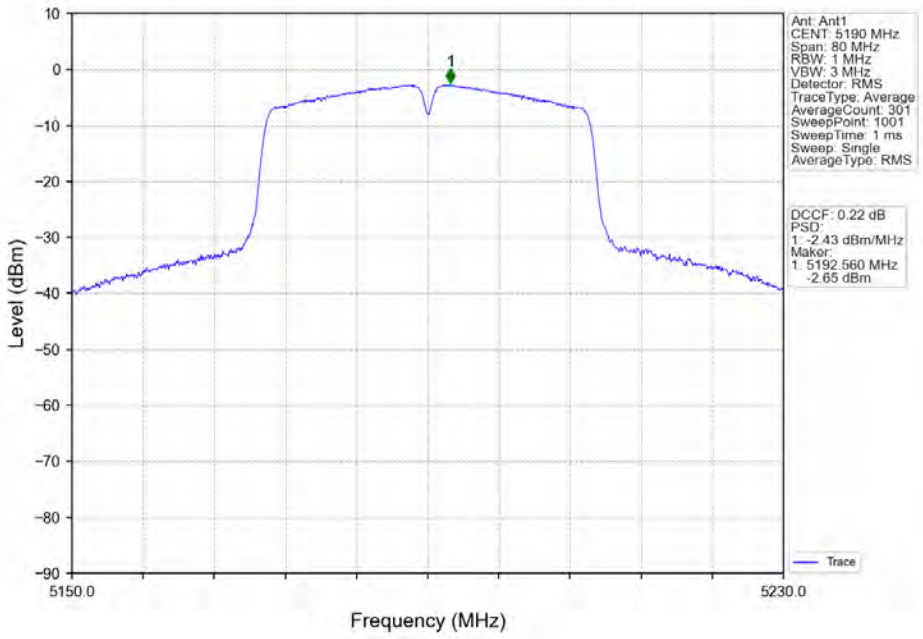
802.11ac(VHT20)_HCH_5240MHz_Ant1_NTNV



802.11ac(VHT40)_LCH_5190MHz_Ant1_NTNV



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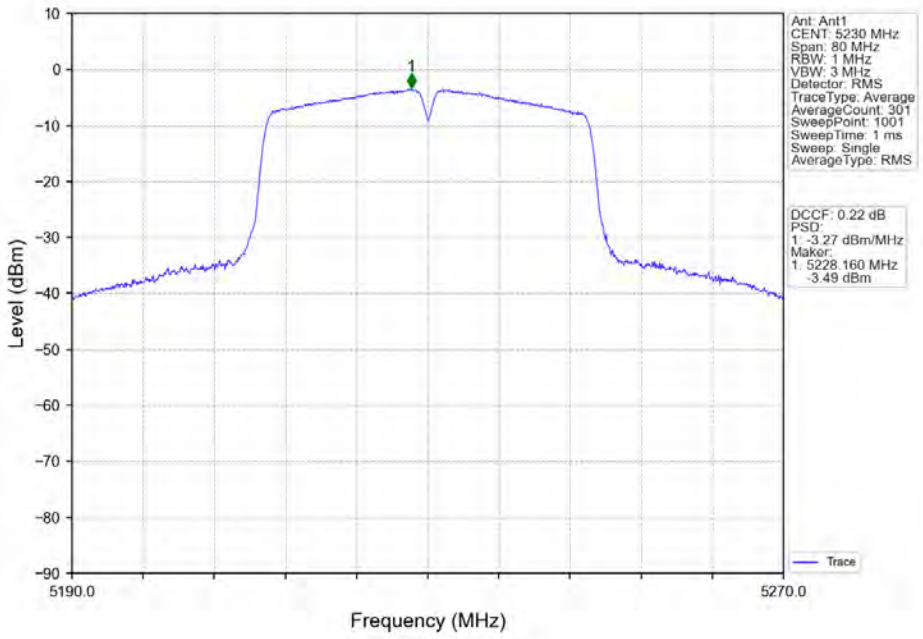
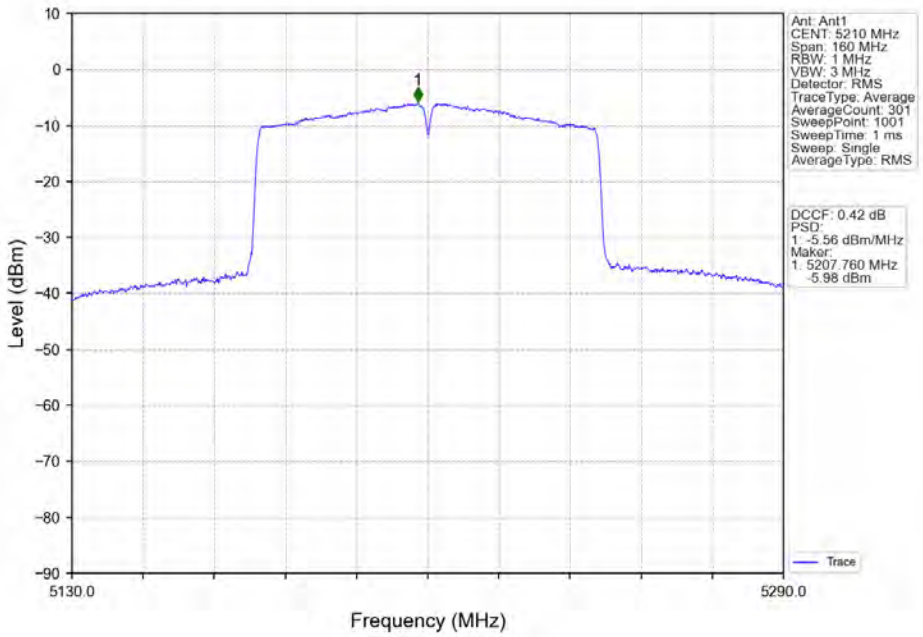
802.11ac(VHT40)_HCH_5230MHz_Ant1_NTNV



802.11ac(VHT80)_MCH_5210MHz_Ant1_NTNV



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5. Frequency Stability

5.1 Ant1

5.1.1 Test Result

Ant1							
Mode	TX Type	Frequency (MHz)	Temperature (°C)	Voltage (VAC)	Measured Frequency (MHz)	Limit (MHz)	Verdict
802.11a	SISO	5180	20	102	5180.000	5150 to 5250	Pass
				120	5180.040	5150 to 5250	Pass
				138	5179.940	5150 to 5250	Pass
			-30	120	5180.020	5150 to 5250	Pass
			-20	120	5180.020	5150 to 5250	Pass
			-10	120	5179.960	5150 to 5250	Pass
			0	120	5180.000	5150 to 5250	Pass
			10	120	5179.940	5150 to 5250	Pass
			30	120	5180.000	5150 to 5250	Pass
			40	120	5180.040	5150 to 5250	Pass
			50	120	5179.960	5150 to 5250	Pass
		5200	20	102	5200.020	5150 to 5250	Pass
				120	5199.920	5150 to 5250	Pass
				138	5200.000	5150 to 5250	Pass
			-30	120	5200.020	5150 to 5250	Pass
			-20	120	5199.980	5150 to 5250	Pass
			-10	120	5200.020	5150 to 5250	Pass
			0	120	5200.020	5150 to 5250	Pass
			10	120	5200.040	5150 to 5250	Pass
			30	120	5199.920	5150 to 5250	Pass
			40	120	5199.960	5150 to 5250	Pass
			50	120	5199.900	5150 to 5250	Pass
		5240	20	102	5240.000	5150 to 5250	Pass
				120	5240.040	5150 to 5250	Pass
				138	5239.920	5150 to 5250	Pass
			-30	120	5240.060	5150 to 5250	Pass
			-20	120	5240.020	5150 to 5250	Pass
			-10	120	5239.900	5150 to 5250	Pass
			0	120	5239.960	5150 to 5250	Pass
			10	120	5239.980	5150 to 5250	Pass
			30	120	5240.000	5150 to 5250	Pass
			40	120	5239.940	5150 to 5250	Pass
			50	120	5239.980	5150 to 5250	Pass
802.11n (HT20)	SISO	5180	20	102	5179.980	5150 to 5250	Pass
				120	5180.000	5150 to 5250	Pass
				138	5180.060	5150 to 5250	Pass
			-30	120	5180.080	5150 to 5250	Pass
			-20	120	5180.100	5150 to 5250	Pass
			-10	120	5179.960	5150 to 5250	Pass
			0	120	5180.020	5150 to 5250	Pass
			10	120	5179.960	5150 to 5250	Pass
			30	120	5180.040	5150 to 5250	Pass
			40	120	5179.960	5150 to 5250	Pass
			50	120	5180.000	5150 to 5250	Pass
		5200	20	102	5199.960	5150 to 5250	Pass

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				120	5200.020	5150 to 5250	Pass
				138	5200.040	5150 to 5250	Pass
			-30	120	5199.980	5150 to 5250	Pass
			-20	120	5200.000	5150 to 5250	Pass
			-10	120	5199.980	5150 to 5250	Pass
			0	120	5200.080	5150 to 5250	Pass
			10	120	5200.000	5150 to 5250	Pass
			30	120	5199.960	5150 to 5250	Pass
			40	120	5199.940	5150 to 5250	Pass
			50	120	5200.060	5150 to 5250	Pass
		5240	20	102	5240.000	5150 to 5250	Pass
				120	5240.000	5150 to 5250	Pass
				138	5240.020	5150 to 5250	Pass
			-30	120	5240.020	5150 to 5250	Pass
			-20	120	5239.940	5150 to 5250	Pass
			-10	120	5240.020	5150 to 5250	Pass
			0	120	5240.000	5150 to 5250	Pass
			10	120	5240.000	5150 to 5250	Pass
			30	120	5239.960	5150 to 5250	Pass
			40	120	5239.920	5150 to 5250	Pass
			50	120	5240.060	5150 to 5250	Pass
802.11n (HT40)	SISO	5190	20	102	5190.000	5150 to 5250	Pass
				120	5190.000	5150 to 5250	Pass
				138	5190.000	5150 to 5250	Pass
			-30	120	5190.000	5150 to 5250	Pass
			-20	120	5190.040	5150 to 5250	Pass
			-10	120	5190.000	5150 to 5250	Pass
			0	120	5190.000	5150 to 5250	Pass
			10	120	5190.040	5150 to 5250	Pass
			30	120	5190.040	5150 to 5250	Pass
			40	120	5190.000	5150 to 5250	Pass
			50	120	5190.000	5150 to 5250	Pass
		5230	20	102	5230.000	5150 to 5250	Pass
				120	5230.040	5150 to 5250	Pass
				138	5230.000	5150 to 5250	Pass
			-30	120	5230.000	5150 to 5250	Pass
			-20	120	5230.000	5150 to 5250	Pass
			-10	120	5230.000	5150 to 5250	Pass
			0	120	5230.040	5150 to 5250	Pass
			10	120	5230.000	5150 to 5250	Pass
			30	120	5230.000	5150 to 5250	Pass
			40	120	5229.960	5150 to 5250	Pass
			50	120	5230.040	5150 to 5250	Pass
802.11ac (VHT20)	SISO	5180	20	102	5180.000	5150 to 5250	Pass
				120	5180.040	5150 to 5250	Pass
				138	5179.920	5150 to 5250	Pass
			-30	120	5179.980	5150 to 5250	Pass
			-20	120	5180.060	5150 to 5250	Pass
			-10	120	5179.980	5150 to 5250	Pass
			0	120	5179.980	5150 to 5250	Pass
			10	120	5180.080	5150 to 5250	Pass
			30	120	5179.980	5150 to 5250	Pass
			40	120	5180.020	5150 to 5250	Pass
			50	120	5180.000	5150 to 5250	Pass

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		5200	20	102	5200.020	5150 to 5250	Pass
				120	5200.120	5150 to 5250	Pass
				138	5199.960	5150 to 5250	Pass
			-30	120	5199.960	5150 to 5250	Pass
			-20	120	5200.040	5150 to 5250	Pass
			-10	120	5200.000	5150 to 5250	Pass
			0	120	5199.960	5150 to 5250	Pass
			10	120	5200.020	5150 to 5250	Pass
			30	120	5200.040	5150 to 5250	Pass
			40	120	5199.980	5150 to 5250	Pass
			50	120	5200.000	5150 to 5250	Pass
		5240	20	102	5239.980	5150 to 5250	Pass
				120	5239.960	5150 to 5250	Pass
				138	5240.040	5150 to 5250	Pass
			-30	120	5240.000	5150 to 5250	Pass
			-20	120	5240.040	5150 to 5250	Pass
			-10	120	5240.000	5150 to 5250	Pass
			0	120	5240.000	5150 to 5250	Pass
			10	120	5240.020	5150 to 5250	Pass
			30	120	5240.000	5150 to 5250	Pass
			40	120	5240.040	5150 to 5250	Pass
			50	120	5239.980	5150 to 5250	Pass
802.11ac (VHT40)	SISO	5190	20	102	5190.000	5150 to 5250	Pass
				120	5190.000	5150 to 5250	Pass
				138	5190.040	5150 to 5250	Pass
			-30	120	5190.040	5150 to 5250	Pass
			-20	120	5190.000	5150 to 5250	Pass
			-10	120	5190.000	5150 to 5250	Pass
			0	120	5190.040	5150 to 5250	Pass
			10	120	5190.000	5150 to 5250	Pass
			30	120	5190.000	5150 to 5250	Pass
			40	120	5190.040	5150 to 5250	Pass
			50	120	5190.040	5150 to 5250	Pass
		5230	20	102	5230.040	5150 to 5250	Pass
				120	5230.000	5150 to 5250	Pass
				138	5229.960	5150 to 5250	Pass
			-30	120	5230.040	5150 to 5250	Pass
			-20	120	5230.000	5150 to 5250	Pass
			-10	120	5230.040	5150 to 5250	Pass
			0	120	5230.000	5150 to 5250	Pass
			10	120	5230.040	5150 to 5250	Pass
			30	120	5230.040	5150 to 5250	Pass
			40	120	5230.000	5150 to 5250	Pass
			50	120	5230.000	5150 to 5250	Pass
802.11ac (VHT80)	SISO	5210	20	102	5210.075	5150 to 5250	Pass
				120	5210.075	5150 to 5250	Pass
				138	5210.000	5150 to 5250	Pass
			-30	120	5210.000	5150 to 5250	Pass
			-20	120	5210.000	5150 to 5250	Pass
			-10	120	5210.000	5150 to 5250	Pass
			0	120	5210.000	5150 to 5250	Pass
			10	120	5210.000	5150 to 5250	Pass
			30	120	5210.000	5150 to 5250	Pass
			40	120	5210.000	5150 to 5250	Pass

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			50	120	5210.000	5150 to 5250	Pass

6. Form731

6.1 Form731

6.1.1 Test Result

Lower Freq (MHz)	High Freq (MHz)	MAX Power (W)	MAX Power (dBm)
5180	5240	0.0120	10.80
5190	5230	0.0130	11.13
5210	5210	0.0122	10.87

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