RF Test Report

For

Applicant Name:	**Sichuan AI-Link Technology Co.,Ltd.**
Address:	Anzhou,Industrial park,Mianyang,Sichuan,China
EUT Name:	WIFI &Bluetooth Module
Brand Name:	N/A
Model Number:	WF-M63B-USJ1
Series Model Number:	N/A

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:	BTF240712R00704
Test Standards:	47 CFR Part 15E
Test Conclusion:	Pass
FCC ID:	2AOKI-WFM63BUSJ1
Test Date:	2024-07-15 to 2024-08-21
Date of Issue:	2024-08-22
Prepared By:	Sunny Qin
	Sunny Qin / Project Engineer
Date:	2024-08-22
Approved By:	Ryan Qu
	Ryan Qu / EMC Manager
Date:	2024-08-22

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Revision History		
Version	Issue Date	Revisions Content
R_V0	2024-08-22	Original
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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:	Sichuan AI-Link Technology Co.,Ltd.
Address:	Anzhou,Industrial park,Mianyang,Sichuan,China

2.2 Manufacturer Information

Company Name:	Sichuan AI-Link Technology Co.,Ltd.
Address:	Anzhou,Industrial park,Mianyang,Sichuan,China

2.3 Factory Information

Company Name:	Sichuan AI-Link Technology Co.,Ltd.
Address:	Anzhou,Industrial park,Mianyang,Sichuan,China

2.4 General Description of Equipment under Test (EUT)

EUT Name:	WIFI &Bluetooth Module
Test Model Number:	WF-M63B-USJ1
Hardware Version:	JU17.820
Software Version:	WinDriverV.0.0.2.5_FWv.67c4fb6a

2.5 Technical Information

Power Supply:	DC 3.3V
Power Adaptor:	N/A
Operation Frequency Range	U-NII Band 1: 5.18~5.24 GHz U-NII Band 2A: 5.26~5.32 GHz U-NII Band 2C: 5.50~5.70 GHz U-NII Band 3: 5.745~5.825 GHz
Frequency Block	U-NII Band 1: 5.15~5.25 GHz U-NII Band 2A: 5.25~5.35 GHz U-NII Band 2C: 5.47~5.725 GHz U-NII Band 3: 5.725~5.85 GHz
Channel Bandwidth	802.11a: 20 MHz 802.11n: 20 MHz/40 MHz 802.11ac: 20 MHz/40 MHz/80 MHz
Number of transmit chain:	2 (802.11a/n20/n40/ac20/ac40/ac80 all used two antennas, but 802.11a support SISO and 802.11/n20/n40/ac20/ac40/ac80 support MIMO.)
Antenna Type:	FPC antenna (The module is sold without an antenna, this antenna is only used as an accessory to assist eut testing)
Antenna Gain:	5.18~5.24 GHz: 4.32dBi 5.26~5.32 GHz: 4.32dBi 5.50~5.70 GHz: 4.16dBi 5.725~5.85 GHz: 4.06dBi
Directional gain:	5.18~5.24 GHz: G_{ANT} + 10 log(N_{ANT}) dBi=4.32+10 log(2)=7.33dBi 5.26~5.32 GHz: G_{ANT} + 10 log(N_{ANT}) dBi=4.32+10 log(2)=7.33dBi 5.50~5.70 GHz: G_{ANT} + 10 log(N_{ANT}) dBi=4.16+10 log(2)=7.17dBi 5.725~5.85 GHz: G_{ANT} + 10 log(N_{ANT}) dBi=4.06+10 log(2)=7.07dBi
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
Occupied Bandwidth	±69kHz
Transmitter Power, Conducted	±0.87dB
Power Spectral Density	±0.69dB
Conducted Spurious Emissions	±0.95dB
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
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) 47 CFR Part 15.407(a)(2) 47 CFR Part 15.407(a)(3)(i)	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) 47 CFR Part 15.407(a)(2) 47 CFR Part 15.407(a)(3)(i)	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. 47 CFR Part 15.407(e)	Pass
Channel Availability Check Time	47 CFR Part 15E	47 CFR Part 15.407(h)(2)(ii)	Pass
U-NII Detection Bandwidth	47 CFR Part 15E	47 CFR Part 15.407(h)(2)	Pass
Statistical Performance Check	47 CFR Part 15E	KDB 935210 D02, Clause 5.1 Table 2	Pass
Channel Move Time, Channel Closing Transmission Time	47 CFR Part 15E	47 CFR Part 15.407(h)(2)(iii)	Pass
Non-Occupancy Period Test	47 CFR Part 15E	47 CFR Part 15.407(h)(2)(iv)	Pass
DFS Detection Thresholds	47 CFR Part 15E	KDB 905462 D02, Clause 5.2 Table 3	Pass
Band edge emissions (Radiated)	47 CFR Part 15E	47 CFR Part 15.407(b)(1) 47 CFR Part 15.407(b)(2) 47 CFR Part 15.407(b)(4) 47 CFR Part 15.407(b)(10)	Pass

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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)(2) 47 CFR Part 15.407(b)(4) 47 CFR Part 15.407(b)(10)	Pass

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	2023-11-16	2024-11-15
Coaxial Switcher	SCHWARZBECK	CX210	CX210	2023-11-16	2024-11-15
V-LISN	SCHWARZBECK	NSLK 8127	01073	2023-11-16	2024-11-15
LISN	AFJ	LS16/110VAC	16010020076	2023-11-16	2024-11-15
EMI Receiver	ROHDE&SCHWARZ	ESCI3	101422	2023-11-16	2024-11-15

Duty Cycle					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
RFTest software	/	V1.00	/	/	/
RF Control Unit	Techy	TR1029-1	/	2023-11-16	2024-11-15
RF Sensor Unit	Techy	TR1029-2	/	2023-11-16	2024-11-15
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	2023-11-16	2024-11-15
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

Maximum conducted output power					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
RFTest software	/	V1.00	/	/	/
RF Control Unit	Techy	TR1029-1	/	2023-11-16	2024-11-15
RF Sensor Unit	Techy	TR1029-2	/	2023-11-16	2024-11-15
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	2023-11-16	2024-11-15
WIDEBAND RADIO COMMNUNICATION	Rohde & Schwarz	CMW500	161997	2023-11-16	2024-11-15

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TESTER					
MXA Signal Analyzer	KEYSIGHT	N9020A	MY50410020	2023-11-16	2024-11-15

Power spectral density					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
RFTest software	/	V1.00	/	/	/
RF Control Unit	Techy	TR1029-1	/	2023-11-16	2024-11-15
RF Sensor Unit	Techy	TR1029-2	/	2023-11-16	2024-11-15
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	2023-11-16	2024-11-15
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

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	/	2023-11-16	2024-11-15
RF Sensor Unit	Techy	TR1029-2	/	2023-11-16	2024-11-15
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	2023-11-16	2024-11-15
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

Channel Availability Check Time					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
RFTest software	/	V1.00	/	/	/
RF Control Unit	Techy	TR1029-1	/	2023-11-16	2024-11-15
RF Sensor Unit	Techy	TR1029-2	/	2023-11-16	2024-11-15
Programmable constant temperature and humidity box	ZZCKONG	ZZ-K02A	20210928007	2023-11-16	2024-11-15
Adjustable Direct	Dongguan	etm-6050c	20211026123	2023-11-16	2024-11-15

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Current Regulated Power Supply	Tongmen Electronic Technology Co., LTD				
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

U-NII Detection Bandwidth					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
RFTest software	/	V1.00	/	/	/
RF Control Unit	Techy	TR1029-1	/	2023-11-16	2024-11-15
RF Sensor Unit	Techy	TR1029-2	/	2023-11-16	2024-11-15
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	2023-11-16	2024-11-15
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

Statistical Performance Check					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
RFTest software	/	V1.00	/	/	/
RF Control Unit	Techy	TR1029-1	/	2023-11-16	2024-11-15
RF Sensor Unit	Techy	TR1029-2	/	2023-11-16	2024-11-15
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	2023-11-16	2024-11-15
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

Channel Move Time, Channel Closing Transmission Time					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
RFTest software	/	V1.00	/	/	/
RF Control Unit	Techy	TR1029-1	/	2023-11-16	2024-11-15
RF Sensor Unit	Techy	TR1029-2	/	2023-11-16	2024-11-15
Programmable constant temperature	ZZCKONG	ZZ-K02A	20210928007	2023-11-16	2024-11-15

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and humidity box					
Adjustable Direct Current Regulated Power Supply	Dongguan Tongmen Electronic Technology Co., LTD	etm-6050c	20211026123	2023-11-16	2024-11-15
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

Non-Occupancy Period Test					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
RFTest software	/	V1.00	/	/	/
RF Control Unit	Techy	TR1029-1	/	2023-11-16	2024-11-15
RF Sensor Unit	Techy	TR1029-2	/	2023-11-16	2024-11-15
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	2023-11-16	2024-11-15
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

DFS Detection Thresholds					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
RFTest software	/	V1.00	/	/	/
RF Control Unit	Techy	TR1029-1	/	2023-11-16	2024-11-15
RF Sensor Unit	Techy	TR1029-2	/	2023-11-16	2024-11-15
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	2023-11-16	2024-11-15
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

Band edge emissions (Radiated)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Coaxial cable Multiflex 141	Schwarzbeck	N/SMA 0.5m	517386	/	/
Preamplifier	SCHWARZBECK	BBV9744	00246	2023-11-16	2023-11-23

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RE Cable	REBES Talent	UF1-SMASMAM-10m	21101566	2023-11-16	2024-11-15
RE Cable	REBES Talent	UF2-NMNM-10m	21101570	2023-11-16	2024-11-15
RE Cable	REBES Talent	UF1-SMASMAM-1m	21101568	2023-11-16	2024-11-15
RE Cable	REBES Talent	UF2-NMNM-1m	21101576	2023-11-16	2024-11-15
RE Cable	REBES Talent	UF2-NMNM-2.5m	21101573	2023-11-16	2024-11-15
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	2024-11-15
Horn Antenna	SCHWARZBECK	BBHA9170	01157	2023-11-16	2024-11-15
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	2023-11-16	2024-11-15
Horn Antenna	SCHWARZBECK	BBHA9120D	2597	2023-11-16	2024-11-15
EZ_EMC	Frad	FA-03A2 RE+	/	/	/
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/
Log periodic antenna	SCHWARZBECK	VULB 9168	01328	2023-11-16	2024-11-15

Undesirable emission limits (below 1GHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Coaxial cable Multiflex 141	Schwarzbeck	N/SMA 0.5m	517386	/	/
Preamplifier	SCHWARZBECK	BBV9744	00246	2023-11-16	2024-11-15
RE Cable	REBES Talent	UF1-SMASMAM-10m	21101566	2023-11-16	2024-11-15
RE Cable	REBES Talent	UF2-NMNM-10m	21101570	2023-11-16	2024-11-15
RE Cable	REBES Talent	UF1-SMASMAM-1m	21101568	2023-11-16	2024-11-15
RE Cable	REBES Talent	UF2-NMNM-1m	21101576	2023-11-16	2024-11-15
RE Cable	REBES Talent	UF2-NMNM-2.5m	21101573	2023-11-16	2024-11-15
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/
Horn Antenna	SCHWARZBECK	BBHA9170	01157	2023-11-16	2024-11-15
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	2023-11-16	2024-11-15
Horn Antenna	SCHWARZBECK	BBHA9120D	2597	2023-11-16	2024-11-15
EZ_EMC	Frad	FA-03A2 RE+	/	/	/
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/

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Log periodic antenna	SCHWARZBECK	VULB 9168	01328	2021-11-28	2024-11-15

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	/	/
Preamplifier	SCHWARZBECK	BBV9744	00246	2023-11-16	2024-11-15
RE Cable	REBES Talent	UF1-SMASMAM-10m	21101566	2023-11-16	2024-11-15
RE Cable	REBES Talent	UF2-NMNM-10m	21101570	2023-11-16	2024-11-15
RE Cable	REBES Talent	UF1-SMASMAM-1m	21101568	2023-11-16	2024-11-15
RE Cable	REBES Talent	UF2-NMNM-1m	21101576	2023-11-16	2024-11-15
RE Cable	REBES Talent	UF2-NMNM-2.5m	21101573	2023-11-16	2024-11-15
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/
Horn Antenna	SCHWARZBECK	BBHA9170	01157	2023-11-16	2024-11-15
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	2023-11-16	2024-11-15
Horn Antenna	SCHWARZBECK	BBHA9120D	2597	2023-11-16	2024-11-15
EZ_EMC	Frad	FA-03A2 RE+	/	/	/
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/
Log periodic antenna	SCHWARZBECK	VULB 9168	01328	2023-11-16	2024-11-15

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4.2 Test Auxiliary Equipment

Description	Manufacturer	Model	Serial No.	Length	Description
Notebook computer	ASUSTEK computer Inc	S4000U	/	/	/
FPC antenna	/	/	/	/	/
Computer	DELL	Vostro 5890	/	/	/
USB to TTL serial port board	/	/	/	/	/

4.3 Test Modes

No.	Test Modes	Description
TM1	802.11a mode	Keep the EUT connect to AC power line and works 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 connect to AC power line and works 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 connect to AC power line and works in continuously transmitting mode with 802.11ac modulation type. Only the data of worst case is recorded in the report.
TM4	Normal Operating	Keep the EUT works in normal operating mode and connect to companion device

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5 Evaluation Results (Evaluation)

5.1 Antenna requirement

Test Requirement:	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.

6 Radio Spectrum Matter Test Results (RF)

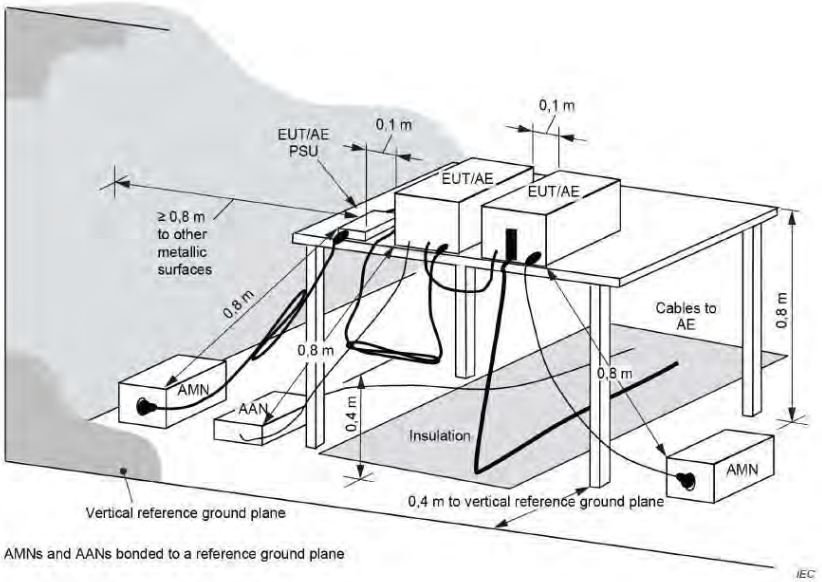
6.1 Conducted Emission at AC power line

Test Requirement:	47 CFR Part 15.207(a)		
Test Method:	Refer to ANSI C63.10-2020 section 6.2, standard test method for ac power-line conducted emissions from unlicensed wireless devices		
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:

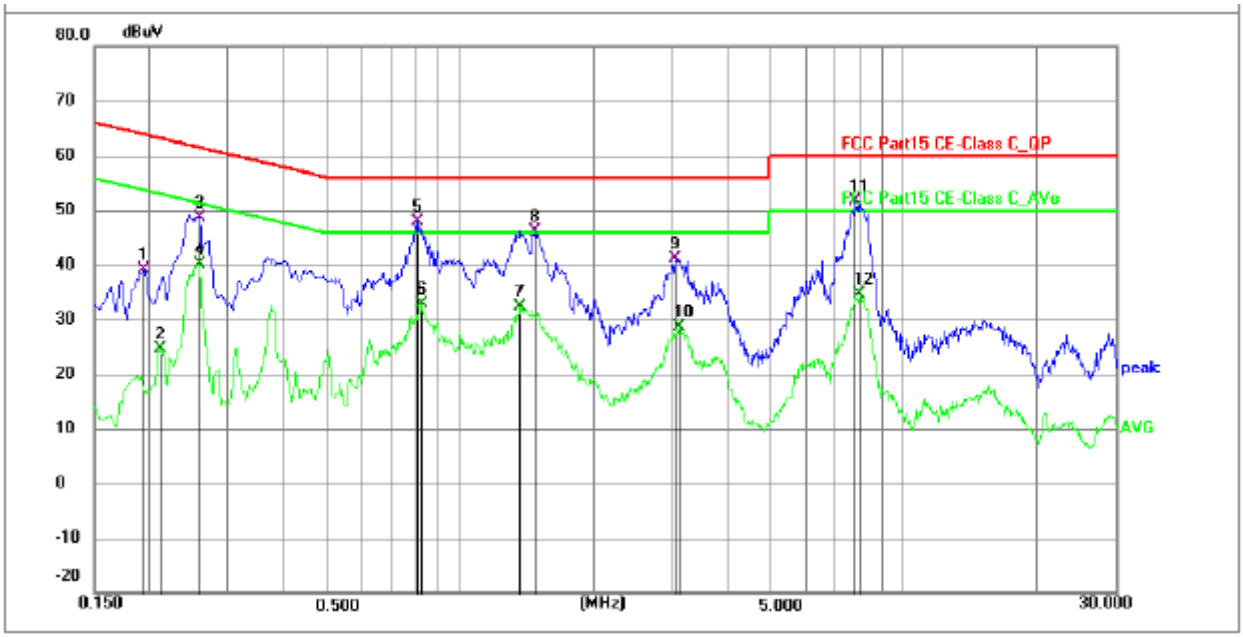
Operating Environment:	
Temperature:	25.5 °C
Humidity:	50.6 %
Atmospheric Pressure:	1010 mbar

6.1.2 Test Setup Diagram:



6.1.3 Test Data:

All modes of both antennas were tested, with antenna 2 having the worst data, and only the worst data showed in the report, the worst mode is 802.11ac20 TX- 5825MHz.
Line: Line



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1949	28.63	10.55	39.18	63.83	-24.65	QP	P	
2	0.2104	14.06	10.56	24.62	53.19	-28.57	AVG	P	
3	0.2580	38.19	10.56	48.75	61.50	-12.75	QP	P	
4	0.2580	29.59	10.56	40.15	51.50	-11.35	AVG	P	
5 *	0.8024	37.10	10.69	47.79	56.00	-8.21	QP	P	
6	0.8205	22.07	10.69	32.76	46.00	-13.24	AVG	P	
7	1.3692	21.71	10.66	32.37	46.00	-13.63	AVG	P	
8	1.4730	35.57	10.66	46.23	56.00	-9.77	QP	P	
9	3.0570	30.49	10.67	41.16	56.00	-14.84	QP	P	
10	3.1110	18.00	10.67	28.67	46.00	-17.33	AVG	P	
11	7.8000	40.92	10.81	51.73	60.00	-8.27	QP	P	
12	7.9440	23.84	10.81	34.65	50.00	-15.35	AVG	P	

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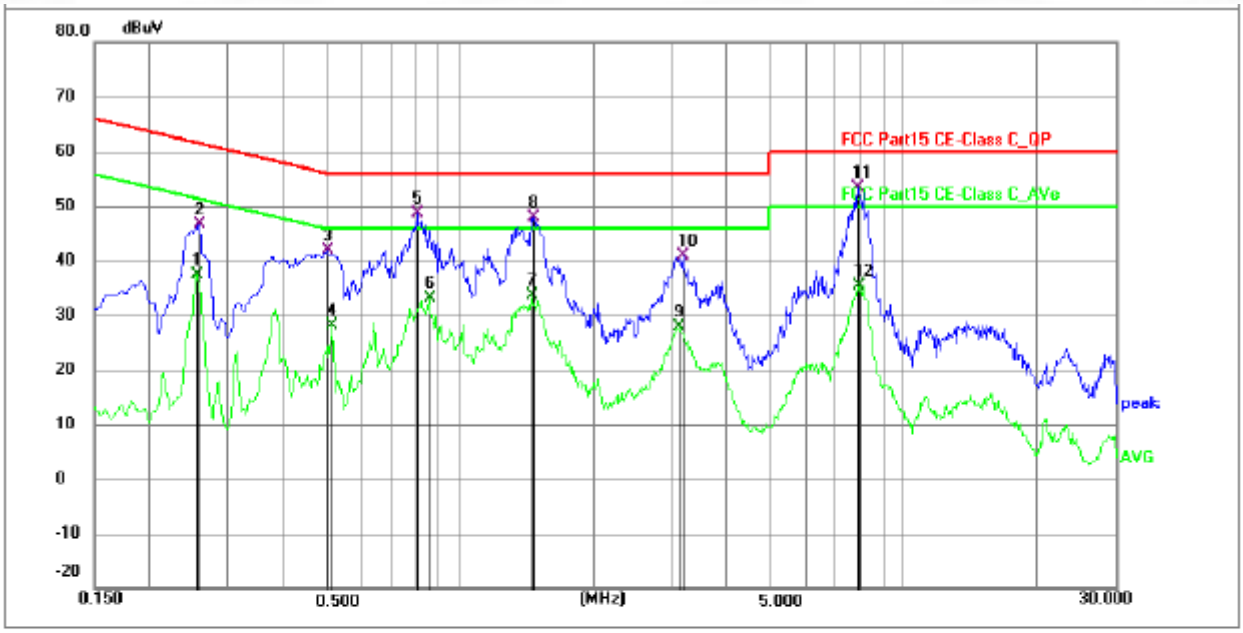
Line: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.2535	26.83	10.56	37.39	51.64	-14.25	AVG	P	
2	0.2580	36.03	10.56	46.59	61.50	-14.91	QP	P	
3	0.5010	31.23	10.57	41.80	56.00	-14.20	QP	P	
4	0.5142	17.50	10.59	28.09	46.00	-17.91	AVG	P	
5	0.8024	37.90	10.69	48.59	56.00	-7.41	QP	P	
6	0.8565	22.48	10.68	33.16	46.00	-12.84	AVG	P	
7	1.4550	22.91	10.66	33.57	46.00	-12.43	AVG	P	
8	1.4640	37.20	10.66	47.86	56.00	-8.14	QP	P	
9	3.1110	17.23	10.67	27.90	46.00	-18.10	AVG	P	
10	3.1740	30.14	10.66	40.80	56.00	-15.20	QP	P	
11 *	7.8765	42.50	10.81	53.31	60.00	-6.69	QP	P	
12	7.9305	24.53	10.81	35.34	50.00	-14.66	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:	25.5 °C
Humidity:	50.6 %
Atmospheric Pressure:	1010 mbar

6.2.2 Test Data:

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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) 47 CFR Part 15.407(a)(2) 47 CFR Part 15.407(a)(3)(i)
Test Method:	ANSI C63.10-2020, section 12.3
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. For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. 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.

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	For the band 5.725-5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. 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. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
Procedure:	Method SA-1 a) Set span to encompass the entire 26 dB EBW or 99% OBW of the signal. b) Set RBW = 1 MHz. c) Set VBW >= 3 MHz. d) Number of points in sweep >= [2 × span / RBW]. (This gives bin-to-bin spacing <= RBW / 2, so that narrowband signals are not lost between frequency bins.) e) Sweep time = auto. f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode. g) If transmit duty cycle < 98%, use a video trigger with the trigger level set to enable triggering only on full power pulses. The transmitter shall 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.” h) Trace average at least 100 traces in power averaging (rms) mode. i) Compute power by integrating the spectrum across the 26 dB EBW or 99% OBW of the signal using the instrument’s band power measurement function, with band limits set equal to the EBW or OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in power units) at 1 MHz intervals extending across the 26 dB EBW or 99% OBW of the spectrum.

6.3.1 E.U.T. Operation:

Operating Environment:	
Temperature:	25.5 °C
Humidity:	50.6 %
Atmospheric Pressure:	1010 mbar

6.3.2 Test Data:

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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) 47 CFR Part 15.407(a)(2) 47 CFR Part 15.407(a)(3)(i)
Test Method:	ANSI C63.10-2020, section 12.5
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. For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. 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 the band 5.725-5.850 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter

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	conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
Procedure:	a) Create an average power spectrum for the EUT operating mode being tested by following the instructions in 12.3.2 for measuring maximum conducted output power using a spectrum analyzer or EMI receiver; that is, select the appropriate test method (SA-1, SA-2, SA-3, or their respective alternatives) and apply it up to, but not including, the step labeled, “Compute power….” (This procedure is required even if the maximum conducted output power measurement was performed using the power meter method PM.) b) Use the peak search function on the instrument to find the peak of the spectrum. c) Make the following adjustments to the peak value of the spectrum, if applicable: 1) If method SA-2 or SA-2A was used, then add [10 log (1 / D)], where D is the duty cycle, to the peak of the spectrum. 2) If method SA-3A was used and the linear mode was used in step h) of 12.3.2.7, add 1 dB to the final result to compensate for the difference between linear averaging and power averaging. d) The result is the PPSD. e) The procedure in item a) through item c) requires the use of 1 MHz resolution bandwidth to satisfy the 1 MHz measurement bandwidth specified by some regulatory authorities.This requirement also permits use of resolution bandwidths less than 1 MHz “provided that the measured power is integrated to show the total power over the measurement bandwidth” (i.e., 1 MHz). If measurements are performed using a reduced resolution bandwidth and integrated over 1 MHz bandwidth, the following adjustments to the procedures apply: 1) Set RBW >= 1 / T, where T is defined in 12.2 a). 2) Set VBW >= [3 × RBW]. 3) Care shall be taken such that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

6.4.1 E.U.T. Operation:

Operating Environment:	
Temperature:	25.5 °C
Humidity:	50.6 %
Atmospheric Pressure:	1010 mbar

6.4.2 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. U-NII 3, U-NII 4: 47 CFR Part 15.407(e)
Test Method:	ANSI C63.10-2020, section 6.9.3 & 12.4 KDB 789033 D02, Clause C.2
Test Limit:	U-NII 1, U-NII 2A, U-NII 2C: No limits, only for report use. U-NII 3, U-NII 4: Within the 5.725-5.850 GHz and 5.850-5.895 GHz bands, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.
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%

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	power bandwidth is the difference between these two frequencies. h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument 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 dB emission bandwidth: a) Set RBW = 100 kHz. b) Set the video bandwidth (VBW) ≥ 3 >= RBW. c) Detector = Peak. d) Trace mode = max hold. e) Sweep = auto couple. f) Allow the trace to stabilize. g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.5.1 E.U.T. Operation:

Operating Environment:	
Temperature:	25.5 °C
Humidity:	50.6 %
Atmospheric Pressure:	1010 mbar

6.5.2 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)(2) 47 CFR Part 15.407(b)(4) 47 CFR Part 15.407(b)(10)
Test Method:	ANSI C63.10-2020, section 12.7.4, 12.7.5, 12.7.6
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. For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz. For transmitters operating solely in the 5.725-5.850 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

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

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	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
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:	25.5 °C
Humidity:	50.6 %

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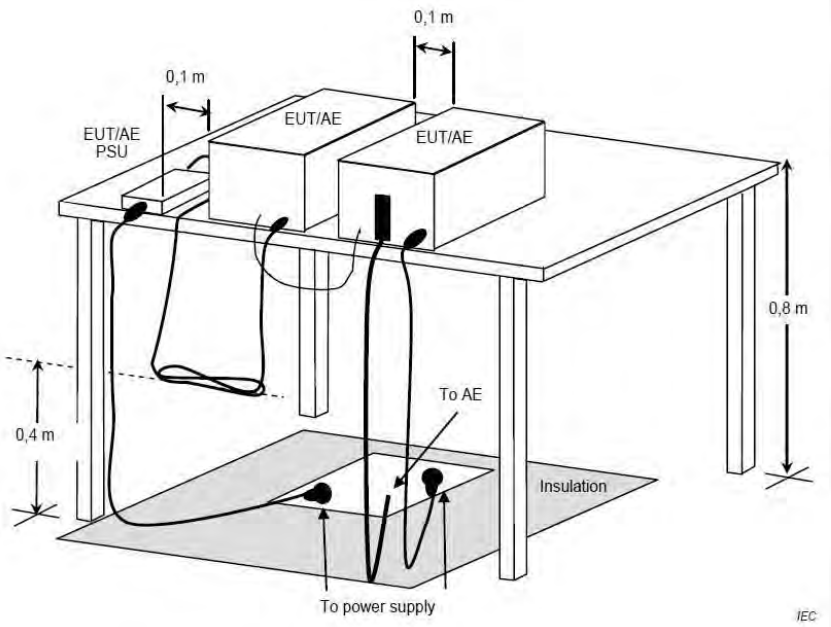
Atmospheric Pressure:	1010 mbar

6.6.2 Test Setup Diagram:



6.6.3 Test Data:

Note: All modes of both antennas were tested, with antenna 2 having the worst data, and only the worst data showed in the report, the worst mode is 802.11ac20

Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
UNII-1 802.11ac20 - 5180MHz Lowest band-edge							
4500.00	70.69	-28.79	41.90	74.00	-32.10	Peak	H
5150.00	71.92	-27.24	44.68	74.00	-29.32	Peak	H
4500.00	69.52	-28.79	40.73	74.00	-33.27	Peak	V
5150.00	73.02	-27.24	45.78	74.00	-28.22	Peak	V

Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
UNII-2a 802.11ac20 - 5320MHz high band-edge							
5350.00	70.05	-27.08	42.97	74.00	-31.03	Peak	H
5460.00	72.31	-26.99	45.32	74.00	-28.68	Peak	H
5350.00	71.33	-27.08	44.25	74.00	-29.75	Peak	V
5460.00	70.50	-26.99	43.51	74.00	-30.49	Peak	V

Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
UNII-2c - 802.11ac20 5500MHz Lowest band-edge							
5460.00	77.55	-26.99	50.56	74.00	-23.44	Peak	H
5470.00	78.56	-26.98	51.58	68.30	-16.72	Peak	H
5460.00	76.43	-26.99	49.44	74.00	-24.56	Peak	V
5470.00	77.76	-26.98	50.78	68.30	-17.52	Peak	V

Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
UNII-2c - 802.11ac205700MHz high band-edge							
5725.00	77.59	-26.22	51.37	68.30	-16.93	Peak	H
5725.00	75.74	-26.22	49.52	68.30	-18.78	Peak	V

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Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
UNII-3 802.11ac20 - 5745MHz Lowest band-edge							
5650.00	68.56	-26.46	42.10	68.20	-26.10	Peak	H
5700.00	91.10	-26.30	64.80	105.20	-40.40	Peak	H
5720.00	98.42	-26.24	72.18	110.80	-38.62	Peak	H
5725.00	97.90	-26.22	71.68	122.20	-50.52	Peak	H
5650.00	71.25	-26.46	44.79	68.20	-23.41	Peak	V
5700.00	91.26	-26.30	64.96	105.20	-40.24	Peak	V
5720.00	97.67	-26.24	71.43	110.80	-39.37	Peak	V
5725.00	99.48	-26.22	73.26	122.20	-48.94	Peak	V

Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
UNII-3 802.11ac20 - 5825MHz Lowest band-edge							
5850.00	96.18	-25.82	70.36	122.20	-51.84	Peak	H
5855.00	91.59	-25.80	65.79	110.80	-45.01	Peak	H
5875.00	71.63	-25.73	45.90	105.20	-59.30	Peak	H
5925.00	73.89	-25.57	48.32	68.20	-19.88	Peak	H
5850.00	97.47	-25.82	71.65	122.20	-50.55	Peak	V
5855.00	93.22	-25.80	67.42	110.80	-43.38	Peak	V
5875.00	73.34	-25.73	47.61	105.20	-57.59	Peak	V
5925.00	69.75	-25.57	44.18	68.20	-24.02	Peak	V

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6.7 Undesirable emission limits (below 1GHz)

Test Requirement:	47 CFR Part 15.407(b)(9)
Test Method:	ANSI C63.10-2020, section 12.7.4, 12.7.5, 12.7.6
Test Limit:	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: 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
Procedure:	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 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:

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	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:	25.5 °C
Humidity:	50.6 %
Atmospheric Pressure:	1010 mbar

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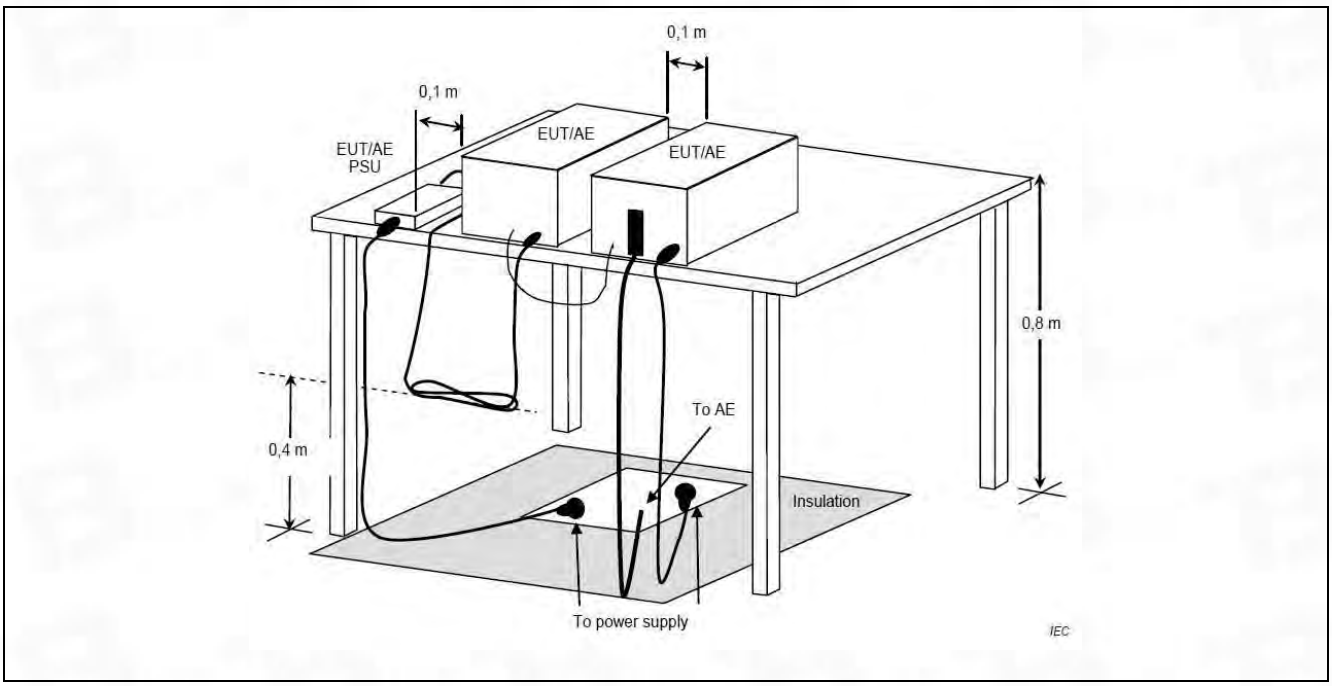
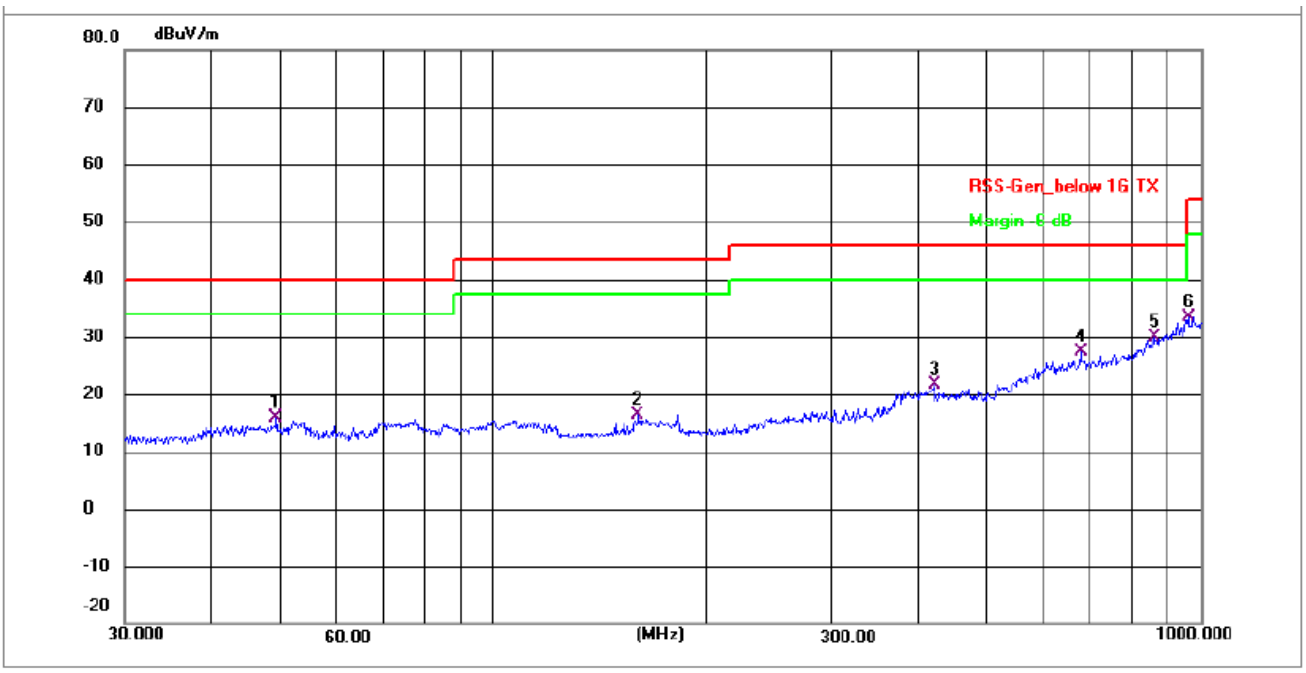
6.7.2 Test Setup Diagram:



6.7.3 Test Data:

Note: All modes of both antennas were tested, with antenna 2 having the worst data, and only the worst data showed in the report, the worst mode is 802.11ac20 TX- 5825MHz.
Polarization: Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	49.3594	39.09	-23.24	15.85	40.00	-24.15	QP	P
2	160.0646	38.39	-21.92	16.47	43.50	-27.03	QP	P
3	419.1080	41.41	-19.67	21.74	46.00	-24.26	QP	P
4	676.3926	45.15	-17.78	27.37	46.00	-18.63	QP	P
5 *	858.5285	46.75	-16.90	29.85	46.00	-16.15	QP	P
6	960.4768	49.16	-15.84	33.32	54.00	-20.68	QP	P

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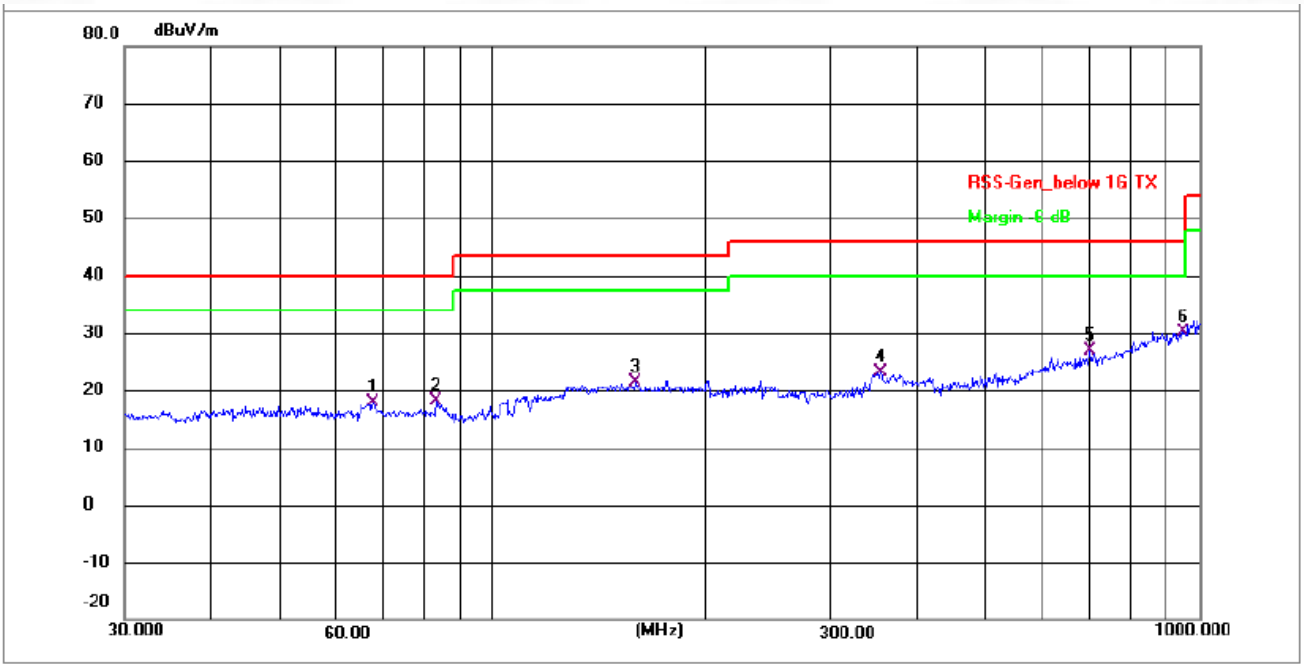
Polarization: Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	67.5562	40.78	-22.96	17.82	40.00	-22.18	QP	P
2	83.0840	40.94	-22.73	18.21	40.00	-21.79	QP	P
3	158.9461	43.28	-21.93	21.35	43.50	-22.15	QP	P
4	352.9433	43.41	-20.21	23.20	46.00	-22.80	QP	P
5	699.3043	44.59	-17.61	26.98	46.00	-19.02	QP	P
6 *	945.4400	46.18	-15.94	30.24	46.00	-15.76	QP	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)(2) 47 CFR Part 15.407(b)(4) 47 CFR Part 15.407(b)(10)
Test Method:	ANSI C63.10-2020, section 12.7.4, 12.7.5, 12.7.6
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. For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz. For transmitters operating solely in the 5.725-5.850 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

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	Measurement

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		(microvolts/meter)	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
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:	25.5 °C
Humidity:	50.6 %
Atmospheric Pressure:	1010 mbar

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6.8.2 Test Data:

Note: All modes of both antennas were tested, with antenna 2 having the worst data, and only the worst data showed in the report, the worst mode is 802.11a.

Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
UNII-1 802.11a - 5180MHz TX mode							
10360.00	71.50	-24.45	47.05	74.00	-26.95	Peak	H
15540.00	71.91	-21.50	50.41	74.00	-23.59	Peak	H
10360.00	68.47	-24.45	44.02	74.00	-29.98	Peak	V
15540.00	73.06	-21.50	51.56	74.00	-22.44	Peak	V

Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
UNII-1 802.11a - 5220MHz TX mode							
10440.00	68.76	-24.49	44.27	74.00	-29.73	Peak	H
15660.00	73.09	-21.53	51.56	74.00	-22.44	Peak	H
10440.00	70.46	-24.49	45.97	74.00	-28.03	Peak	V
15660.00	71.46	-21.53	49.93	74.00	-24.07	Peak	V

Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
UNII-1 802.11a - 5240MHz TX mode							
10480.00	69.11	-24.51	44.60	74.00	-29.40	Peak	H
15720.00	70.33	-21.56	48.77	74.00	-25.23	Peak	H
10480.00	70.54	-24.51	46.03	74.00	-27.97	Peak	V
15720.00	71.47	-21.56	49.91	74.00	-24.09	Peak	V

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Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
UNII-2a 802.11a - 5260MHz TX mode							
10520.00	69.93	-24.40	45.53	74.00	-28.47	Peak	H
15780.00	72.30	-21.55	50.75	74.00	-23.25	Peak	H
10520.00	69.35	-24.40	44.95	74.00	-29.05	Peak	V
15780.00	71.64	-21.55	50.09	74.00	-23.91	Peak	V

Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
UNII-2a 802.11a - 5300MHz TX mode							
10600.00	70.65	-24.30	46.35	74.00	-27.65	Peak	H
15900.00	72.06	-21.57	50.49	74.00	-23.51	Peak	H
10600.00	69.86	-24.30	45.56	74.00	-28.44	Peak	V
15900.00	72.53	-21.57	50.96	74.00	-23.04	Peak	V

Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
UNII- UNII-2a 802.11a - 5320MHz TX mode							
10640.00	70.00	-24.22	45.78	74.00	-28.22	Peak	H
15960.00	71.02	-21.59	49.43	74.00	-24.57	Peak	H
10640.00	69.51	-24.22	45.29	74.00	-28.71	Peak	V
15960.00	70.67	-21.59	49.08	74.00	-24.92	Peak	V

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Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
UNII-2c 802.11a - 5500MHz TX mode							
11000.00	70.90	-23.44	47.46	74.00	-26.54	Peak	H
16500.00	69.64	-19.19	50.45	74.00	-23.55	Peak	H
11000.00	70.02	-23.44	46.58	74.00	-27.42	Peak	V
16500.00	72.32	-19.19	53.13	74.00	-20.87	Peak	V

Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
UNII-2c 802.11a - 5580MHz TX mode							
11160.00	70.04	-23.32	46.72	74.00	-27.28	Peak	H
16740.00	71.65	-18.75	52.90	74.00	-21.10	Peak	H
11160.00	71.78	-23.32	48.46	74.00	-25.54	Peak	V
16740.00	70.21	-18.75	51.46	74.00	-22.54	Peak	V

Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
UNII- UNII-2c 802.11a - 5700MHz TX mode							
11400.00	69.49	-23.14	46.35	74.00	-27.65	Peak	H
17100.00	69.90	-17.89	52.01	74.00	-21.99	Peak	H
11400.00	70.14	-23.14	47.00	74.00	-27.00	Peak	V
17100.00	70.49	-17.89	52.60	74.00	-21.40	Peak	V

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Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
UNII-3 802.11a - 5745MHz TX mode							
11490.00	68.98	-23.07	45.91	74.00	-28.09	Peak	H
17235.00	69.98	-17.36	52.62	74.00	-21.38	Peak	H
11490.00	69.15	-23.07	46.08	74.00	-27.92	Peak	V
17235.00	70.51	-17.36	53.15	74.00	-20.85	Peak	V

Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
UNII-3 802.11a - 5785MHz TX mode							
11570.00	68.78	-22.95	45.83	74.00	-28.17	Peak	H
17355.00	69.20	-16.89	52.31	74.00	-21.69	Peak	H
11570.00	70.58	-22.95	47.63	74.00	-26.37	Peak	V
17355.00	71.03	-16.89	54.14	74.00	-19.86	Peak	V

Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Detector	Polarization
UNII-3 802.11a - 5825MHz TX mode							
11650.00	69.22	-22.80	46.42	74.00	-27.58	Peak	H
17475.00	70.37	-16.41	53.96	74.00	-20.04	Peak	H
11650.00	67.89	-22.80	45.09	74.00	-28.91	Peak	V
17475.00	69.02	-16.41	52.61	74.00	-21.39	Peak	V

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7 Test Setup Photos

Conducted Emission at AC power line

Band edge emissions (Radiated) Emissions in frequency bands (above 1GHz)

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Emissions in frequency bands (below 1GHz)

Appendix

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1. Duty Cycle

1.1 Test Result

1.1.1 Ant1

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	1.393	1.436	97.01	0.13	0.13
		5200	1.393	1.438	96.87	0.14	0.13
		5240	1.391	1.436	96.87	0.14	0.13
		5260	1.391	1.437	96.80	0.14	0.12
		5300	1.391	1.436	96.87	0.14	0.13
		5320	1.391	1.436	96.87	0.14	0.13
		5500	1.391	1.437	96.80	0.14	0.12
		5580	1.393	1.437	96.94	0.14	0.12
		5700	1.393	1.437	96.94	0.14	0.00
		5745	1.392	1.437	96.87	0.14	0.13
		5785	1.393	1.438	96.87	0.14	0.25
		5825	1.393	1.438	96.87	0.14	0.25
802.11n (HT20)	SISO	5180	1.288	1.331	96.77	0.14	0.13
		5200	1.289	1.332	96.77	0.14	0.26
		5240	1.288	1.333	96.62	0.15	0.13
		5260	1.288	1.333	96.62	0.15	0.13
		5300	1.288	1.334	96.55	0.15	0.13
		5320	1.288	1.334	96.55	0.15	0.13
		5500	1.288	1.332	96.70	0.15	0.13
		5580	1.288	1.332	96.70	0.15	0.13
		5700	1.288	1.334	96.55	0.15	0.13
		5745	1.288	1.331	96.77	0.14	0.13
		5785	1.288	1.332	96.70	0.15	0.14
		5825	1.289	1.333	96.70	0.15	0.13
802.11n (HT40)	SISO	5190	0.637	0.680	93.68	0.28	0.25
		5230	0.637	0.680	93.68	0.28	0.13
		5270	0.636	0.680	93.53	0.29	0.26
		5310	0.637	0.681	93.54	0.29	0.13
		5510	0.637	0.680	93.68	0.28	0.13
		5550	0.637	0.680	93.68	0.28	0.13
		5670	0.637	0.680	93.68	0.28	0.13
		5755	0.637	0.681	93.54	0.29	0.12
		5795	0.638	0.680	93.82	0.28	0.13
802.11ac (VHT20)	SISO	5180	1.313	1.357	96.76	0.14	0.13
		5200	1.312	1.356	96.76	0.14	0.13
		5240	1.312	1.358	96.61	0.15	0.13
		5260	1.313	1.358	96.69	0.15	0.13
		5300	1.311	1.356	96.68	0.15	0.13
		5320	1.312	1.358	96.61	0.15	0.13
		5500	1.313	1.356	96.83	0.14	0.00
		5580	1.313	1.357	96.76	0.14	0.13
		5700	1.312	1.356	96.76	0.14	0.13

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		5745	1.313	1.358	96.69	0.15	0.13
		5785	1.313	1.357	96.76	0.14	0.13
		5825	1.312	1.358	96.61	0.15	0.13
802.11ac (VHT40)	SISO	5190	0.653	0.696	93.82	0.28	0.24
		5230	0.653	0.696	93.82	0.28	0.01
		5270	0.653	0.696	93.82	0.28	0.13
		5310	0.653	0.696	93.82	0.28	0.24
		5510	0.653	0.696	93.82	0.28	0.13
		5550	0.653	0.696	93.82	0.28	0.12
		5670	0.653	0.696	93.82	0.28	0.13
		5755	0.652	0.696	93.68	0.28	0.13
		5795	0.653	0.696	93.82	0.28	0.13
802.11ac (VHT80)	SISO	5210	0.328	0.368	89.13	0.50	0.27
		5290	0.326	0.368	88.59	0.53	0.12
		5530	0.326	0.368	88.59	0.53	0.00
		5610	0.328	0.368	89.13	0.50	0.14
		5775	0.328	0.368	89.13	0.50	0.14

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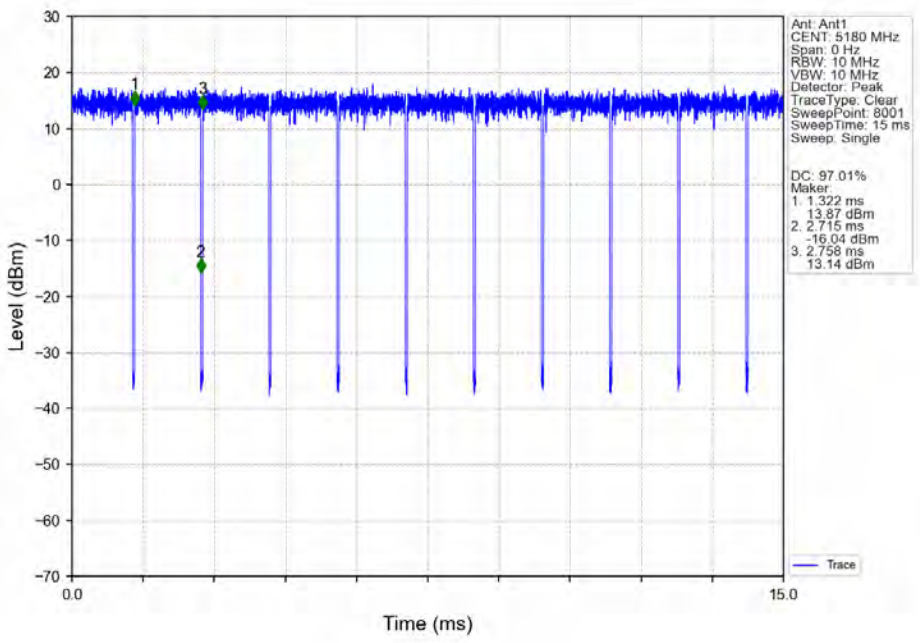
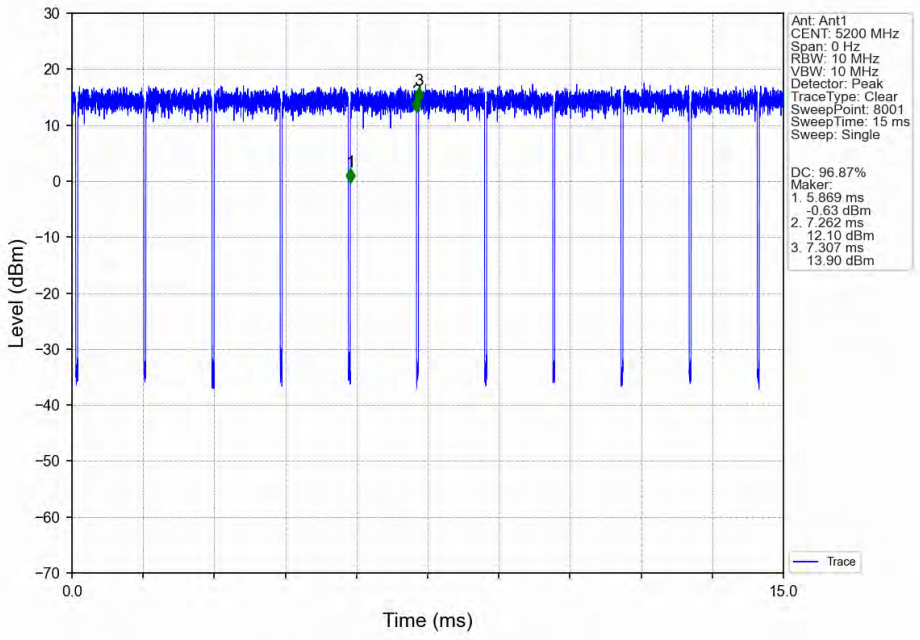
1.2 Test Graph

1.2.1 Ant1

802.11a_LCH_5180MHz_Ant1_NTNV



802.11a_MCH_5200MHz_Ant1_NTNV



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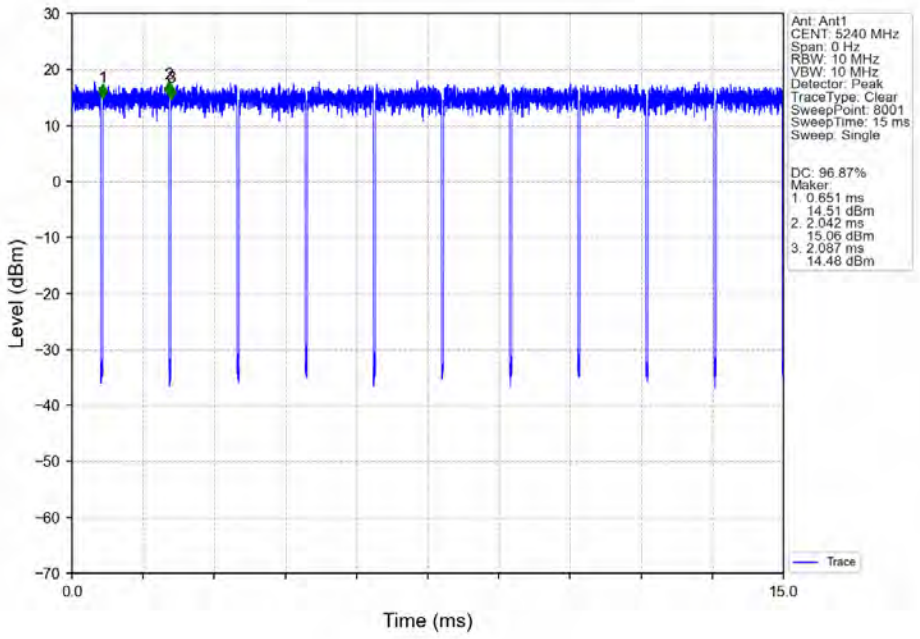
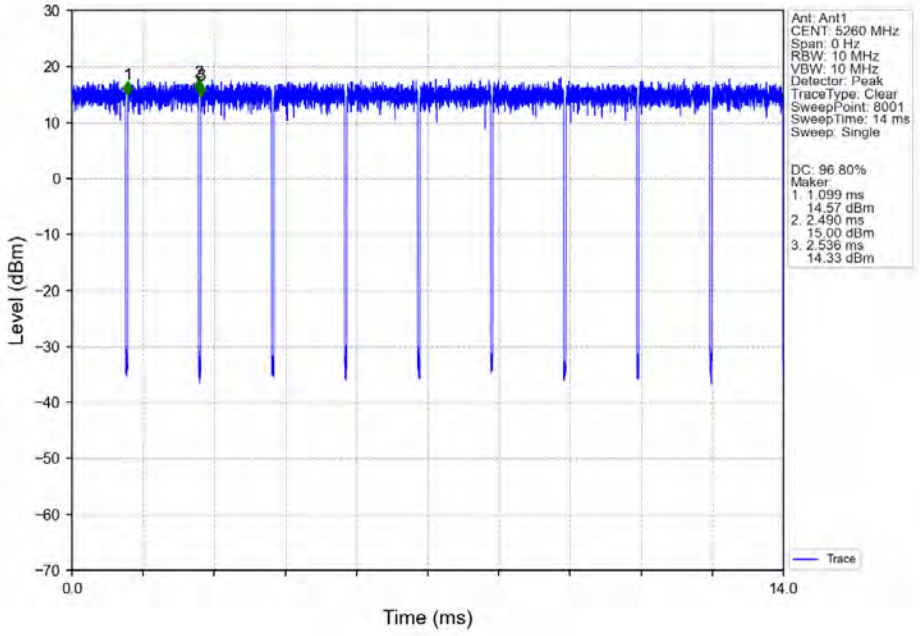
802.11a_HCH_5240MHz_Ant1_NTNV



802.11a_LCH_5260MHz_Ant1_NTNV



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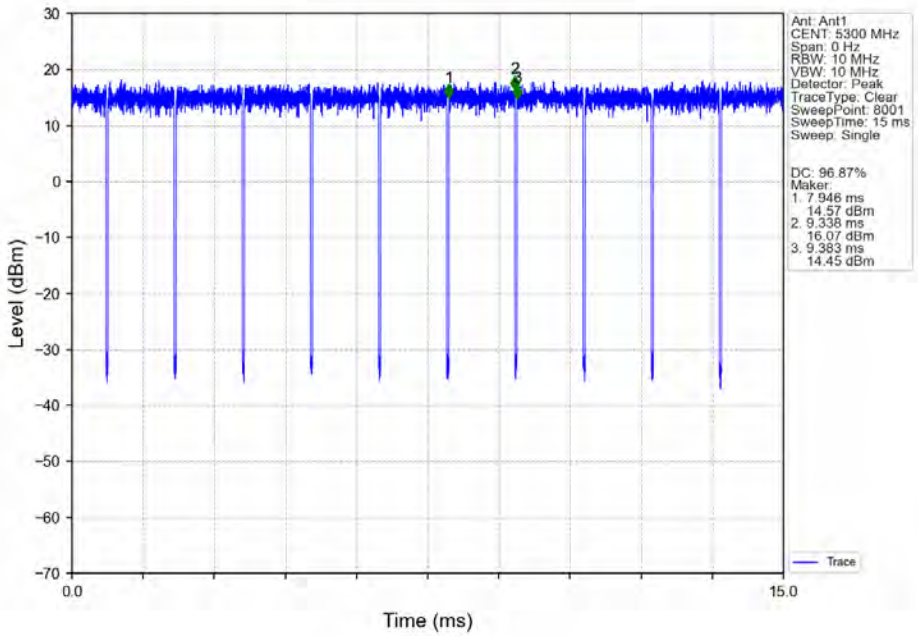
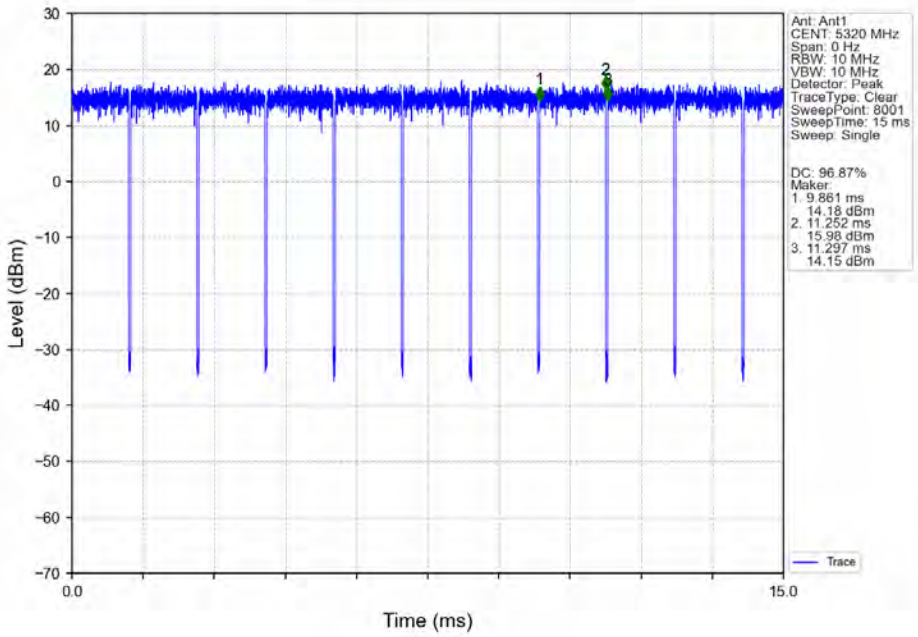
802.11a_MCH_5300MHz_Ant1_NTNV



802.11a_HCH_5320MHz_Ant1_NTNV



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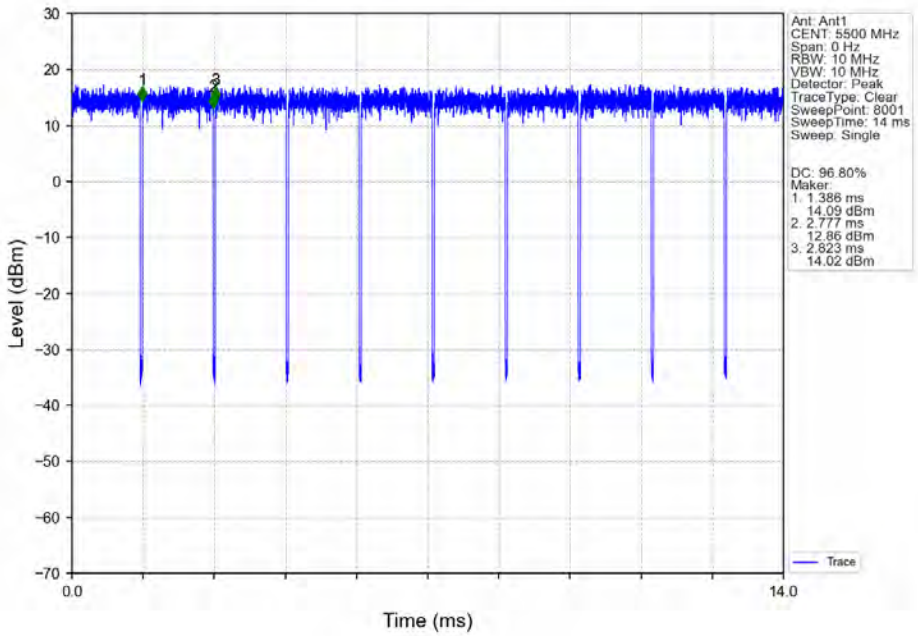
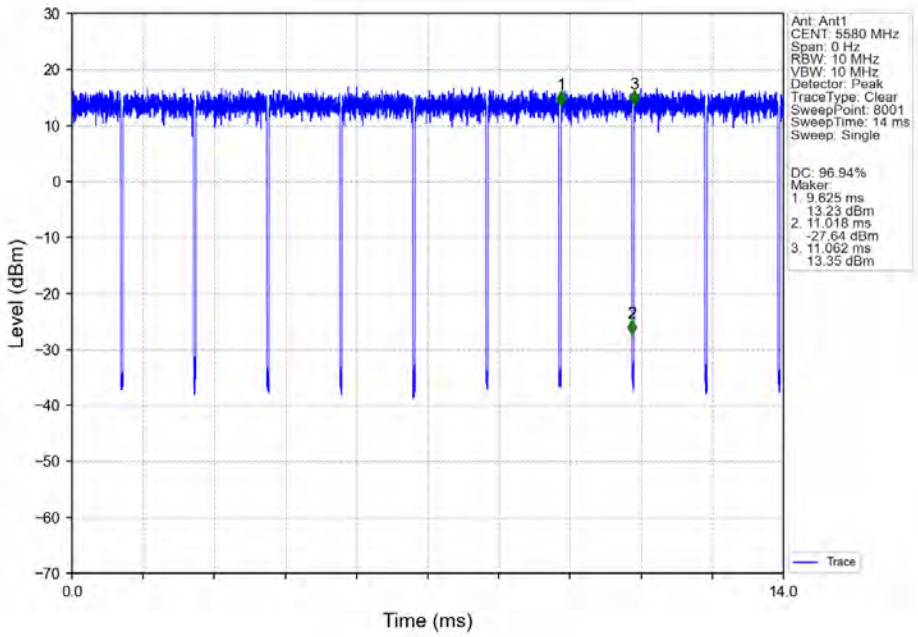
802.11a_LCH_5500MHz_Ant1_NTNV



802.11a_MCH_5580MHz_Ant1_NTNV



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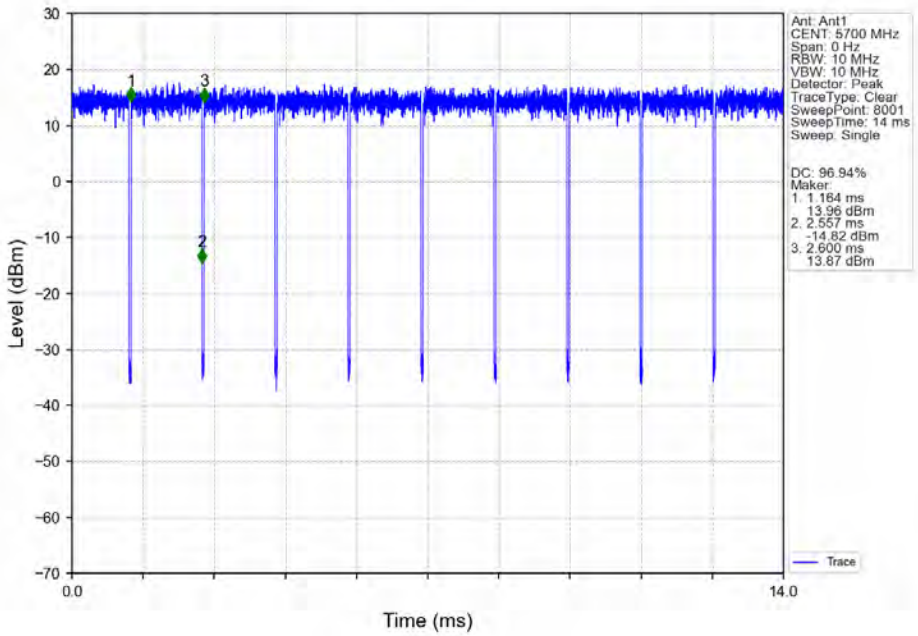
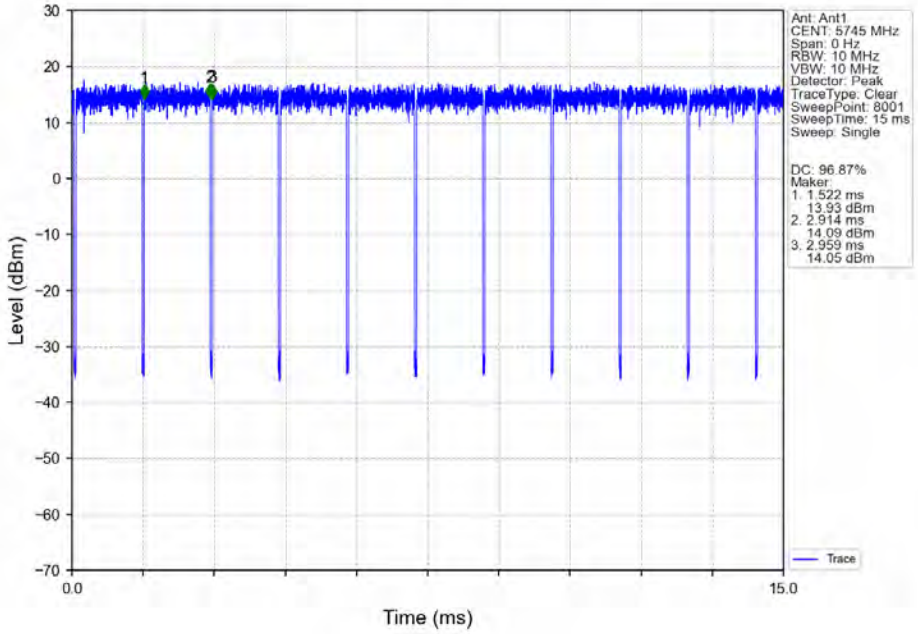
802.11a_HCH_5700MHz_Ant1_NTNV



802.11a_LCH_5745MHz_Ant1_NTNV



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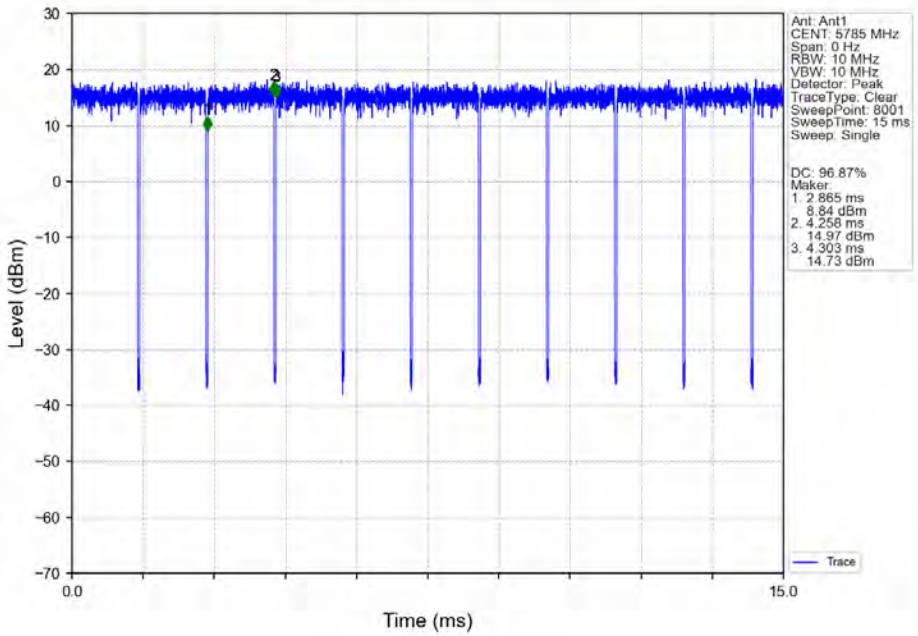
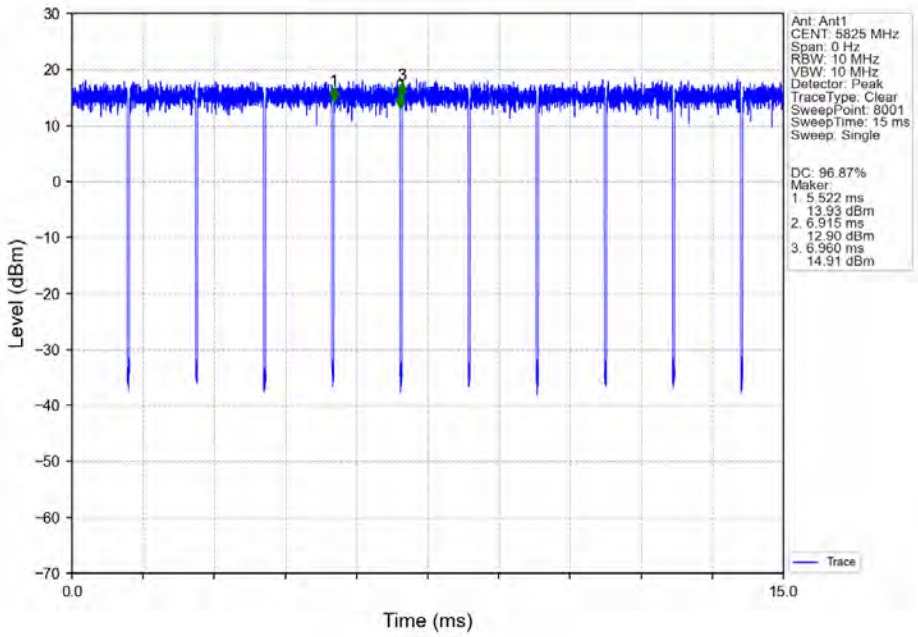
802.11a_MCH_5785MHz_Ant1_NTNV



802.11a_HCH_5825MHz_Ant1_NTNV



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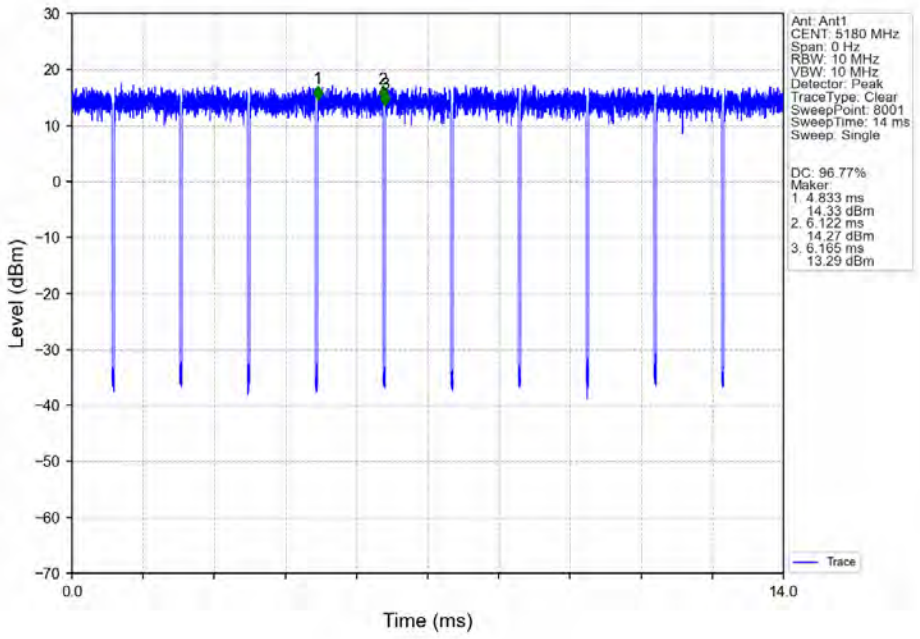
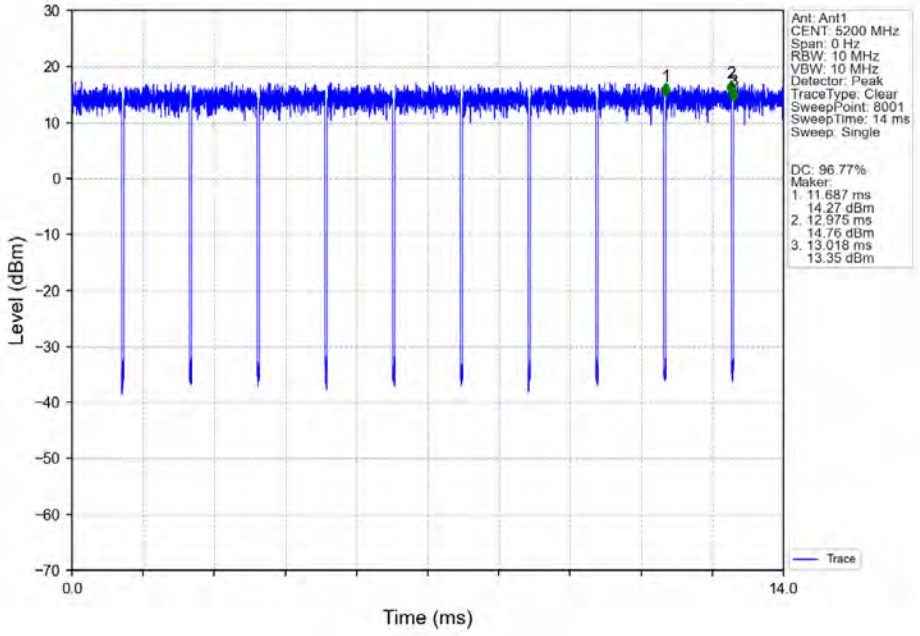
802.11n(HT20)_LCH_5180MHz_Ant1_NTNV



802.11n(HT20)_MCH_5200MHz_Ant1_NTNV



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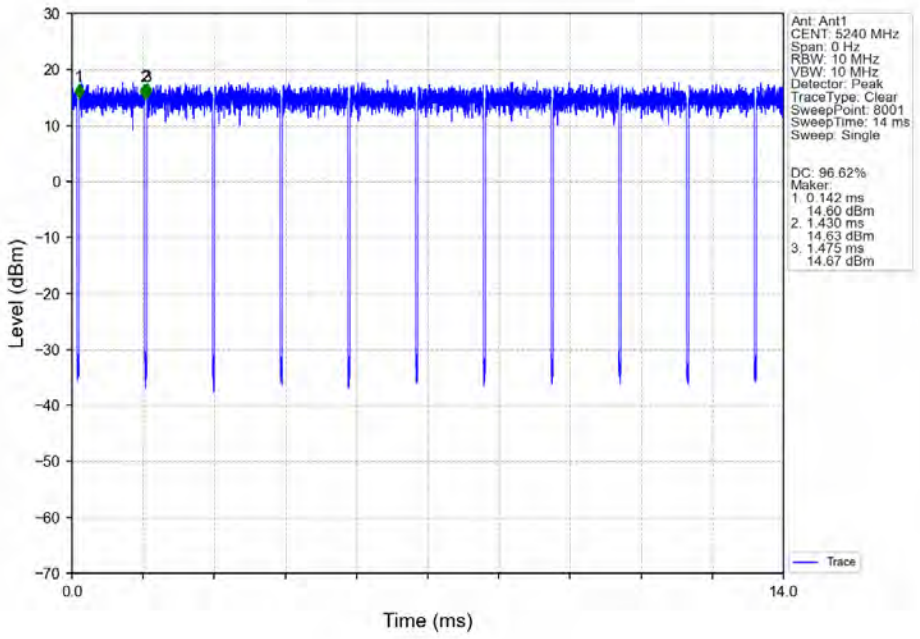
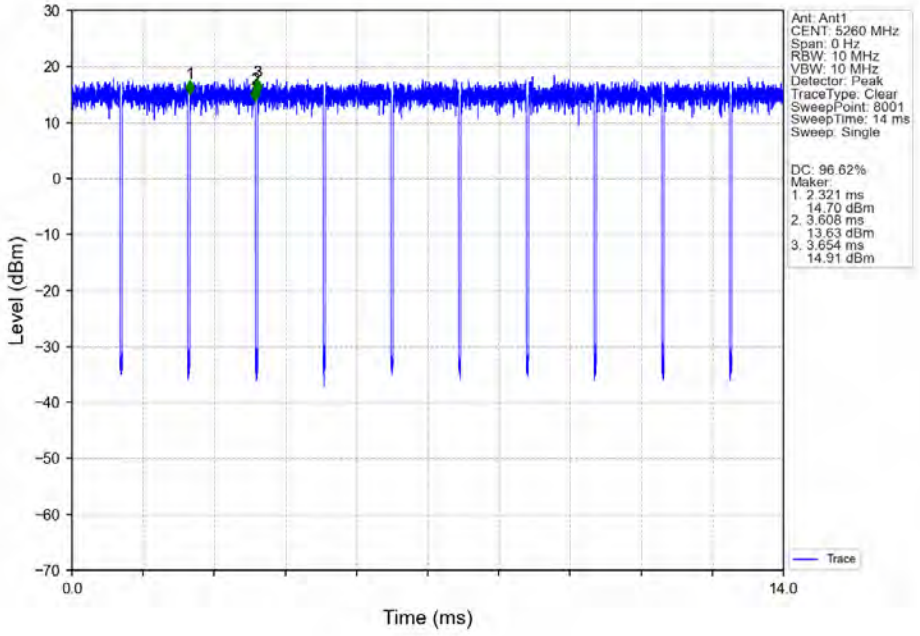
802.11n(HT20)_HCH_5240MHz_Ant1_NTNV



802.11n(HT20)_LCH_5260MHz_Ant1_NTNV



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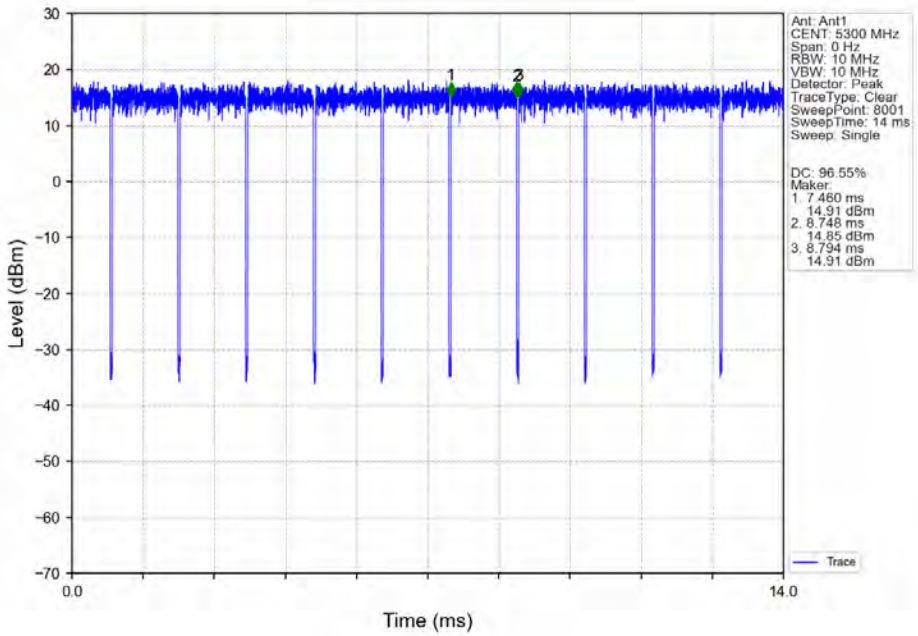
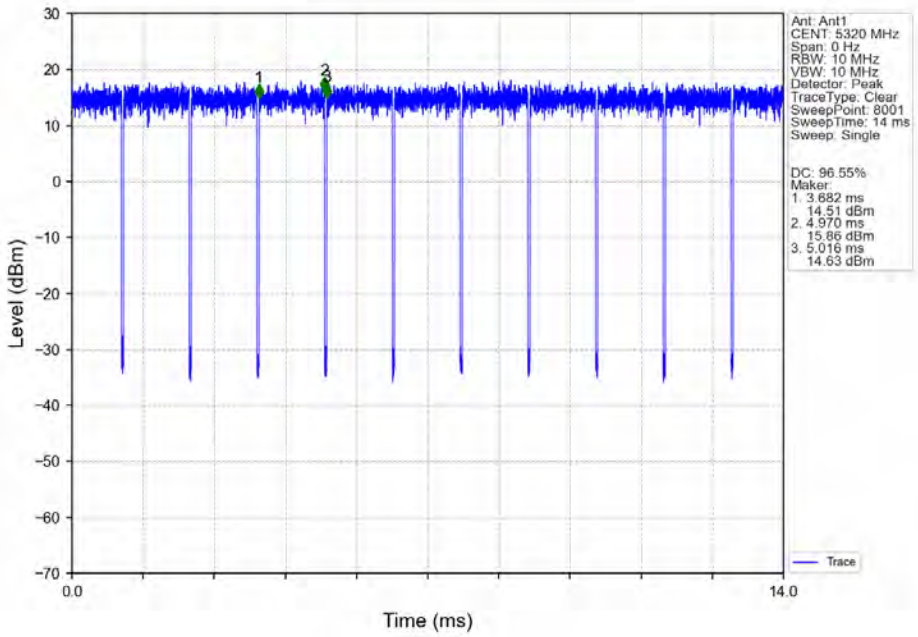
802.11n(HT20)_MCH_5300MHz_Ant1_NTNV



802.11n(HT20)_HCH_5320MHz_Ant1_NTNV



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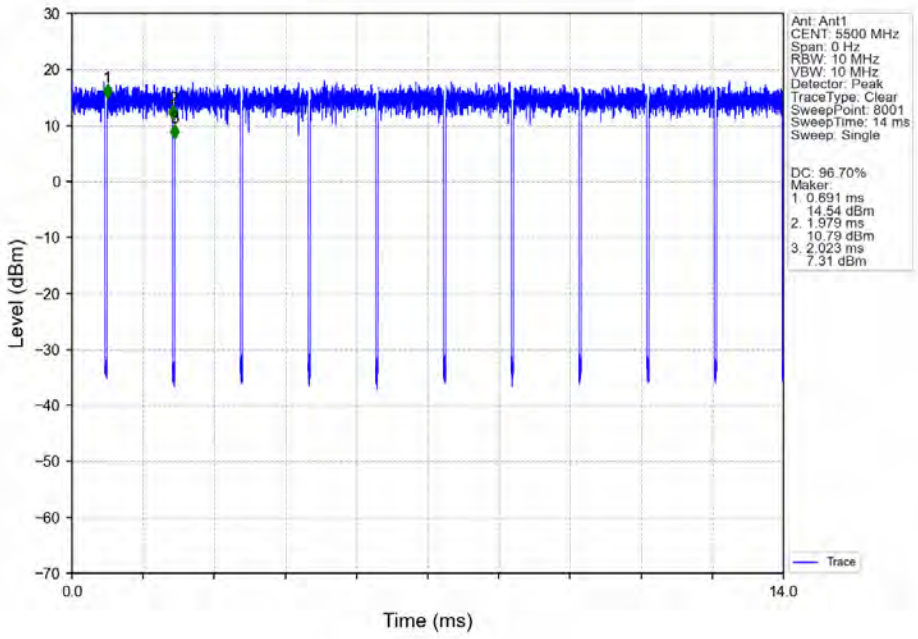
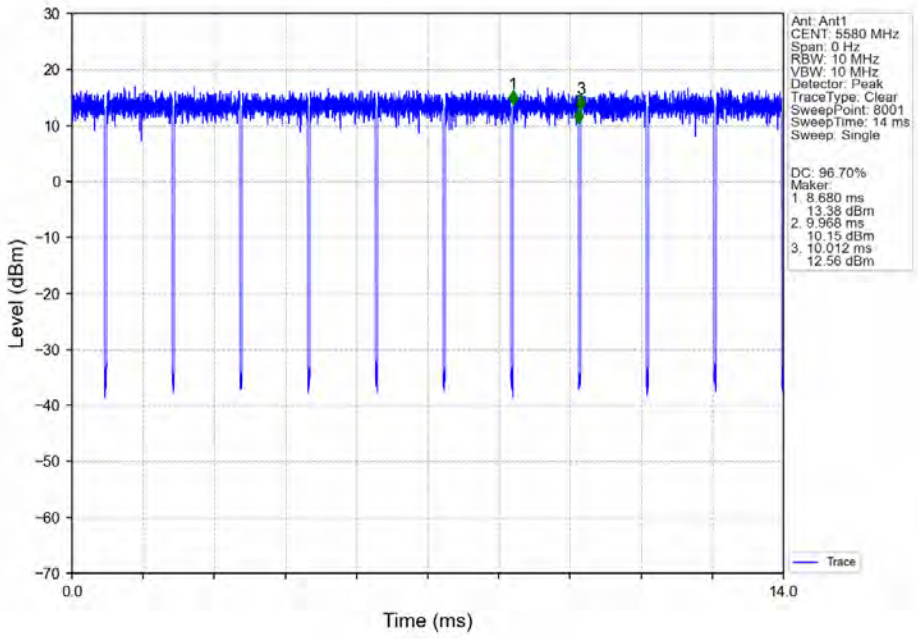
802.11n(HT20)_LCH_5500MHz_Ant1_NTNV



802.11n(HT20)_MCH_5580MHz_Ant1_NTNV



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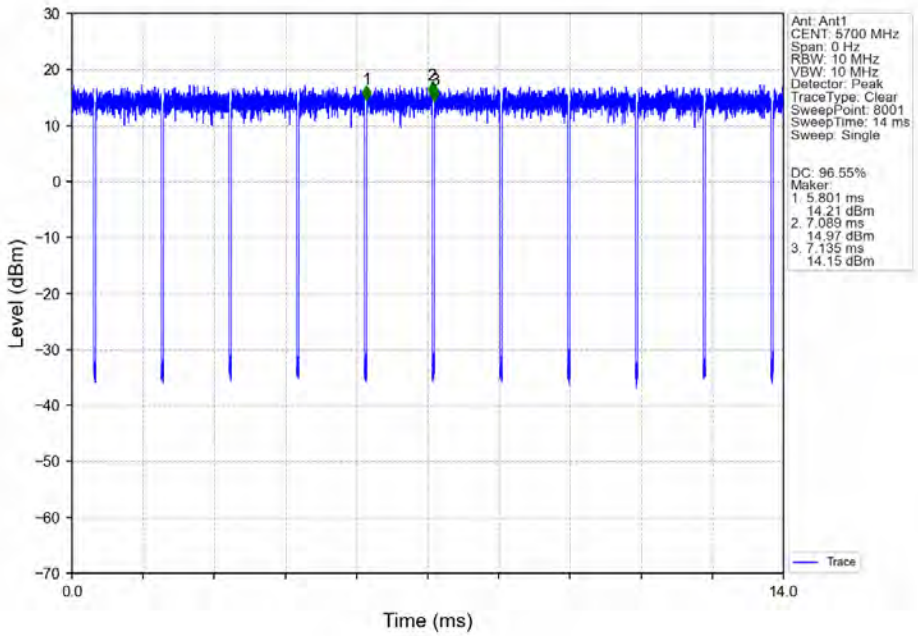
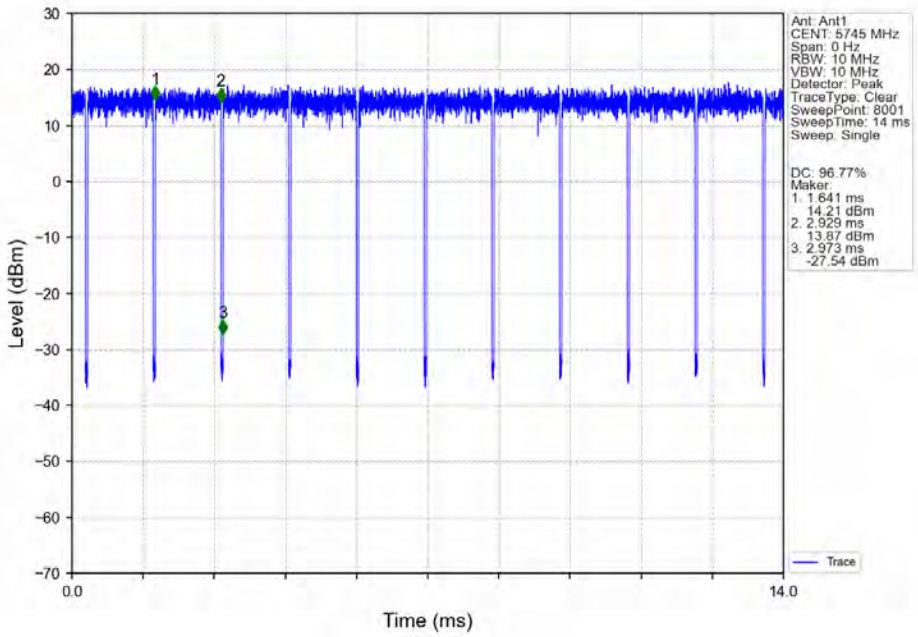
802.11n(HT20)_HCH_5700MHz_Ant1_NTNV



802.11n(HT20)_LCH_5745MHz_Ant1_NTNV



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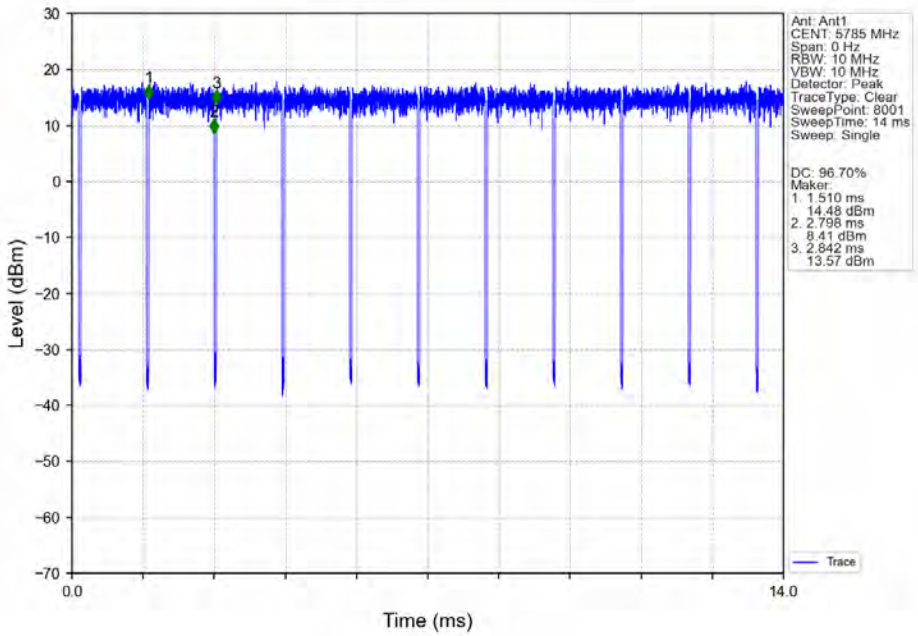
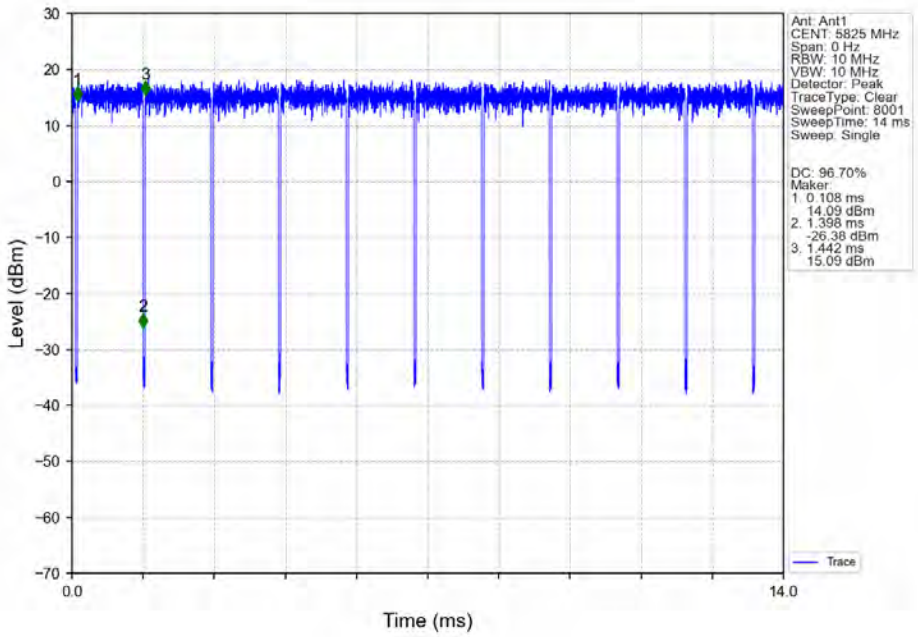
802.11n(HT20)_MCH_5785MHz_Ant1_NTNV



802.11n(HT20)_HCH_5825MHz_Ant1_NTNV



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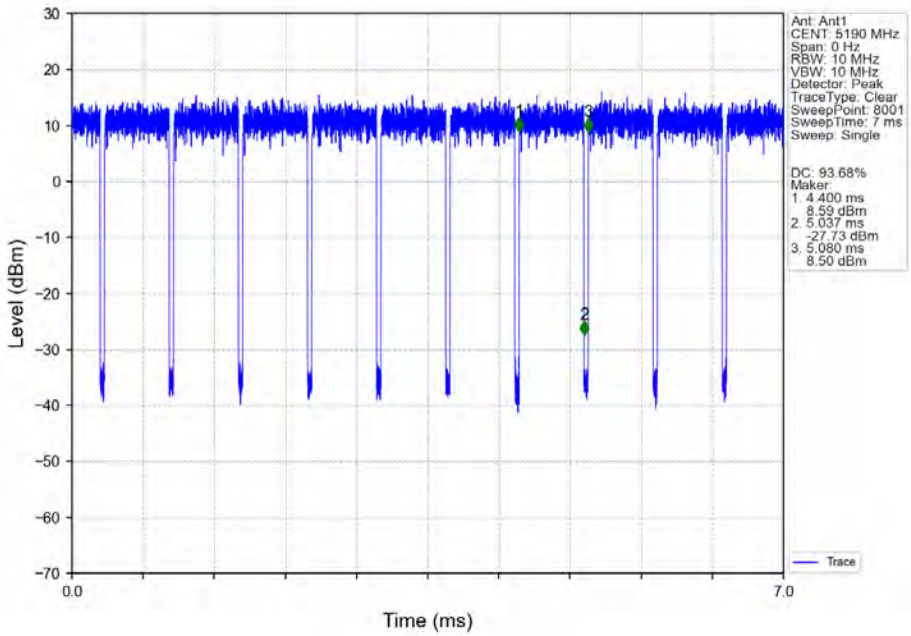
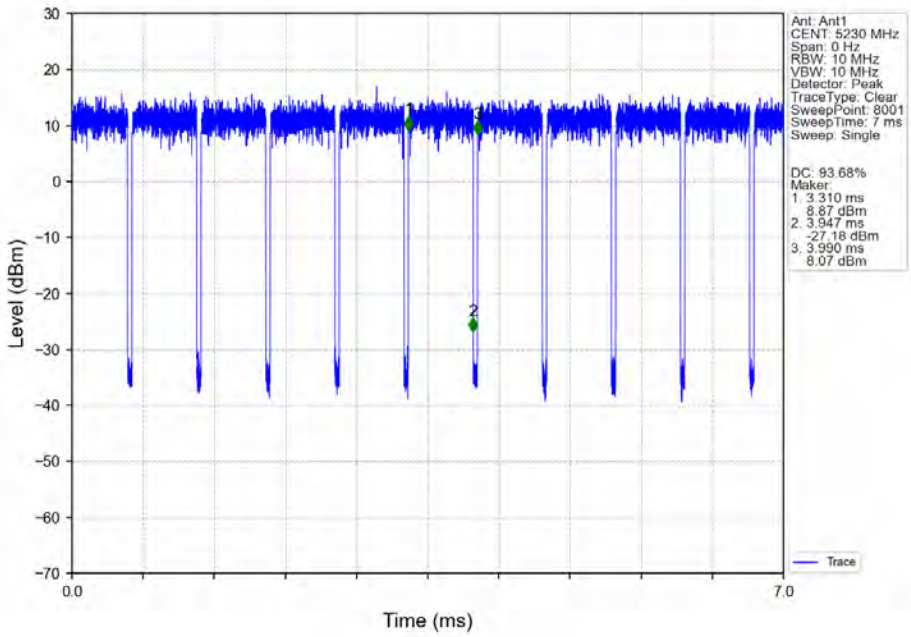
802.11n(HT40)_LCH_5190MHz_Ant1_NTNV



802.11n(HT40)_HCH_5230MHz_Ant1_NTNV



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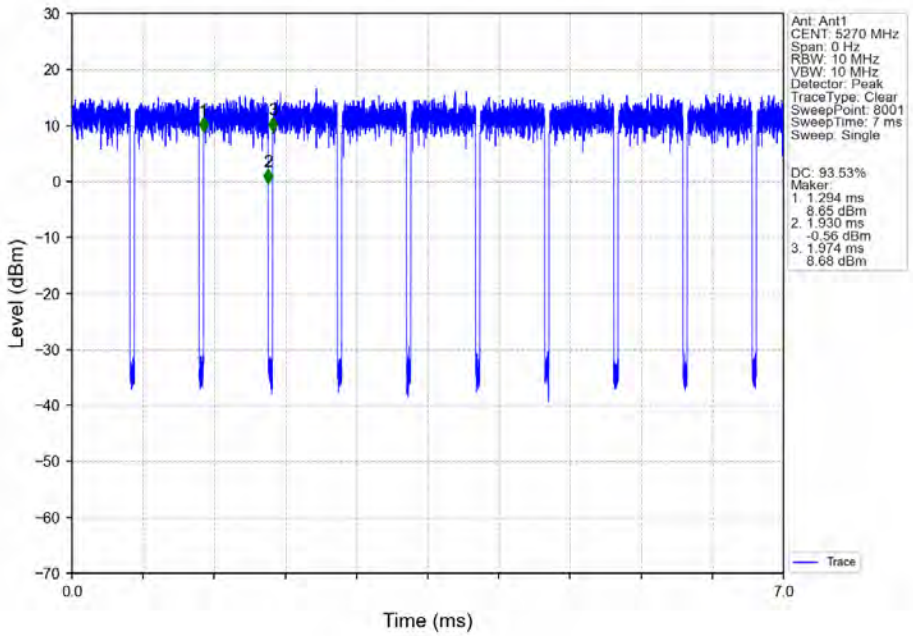
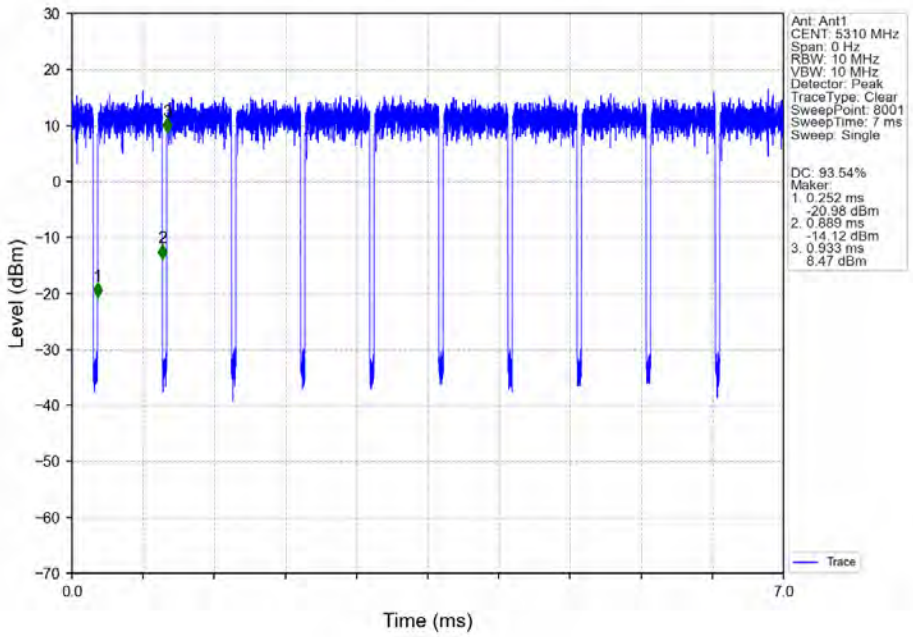
802.11n(HT40)_LCH_5270MHz_Ant1_NTNV



802.11n(HT40)_HCH_5310MHz_Ant1_NTNV



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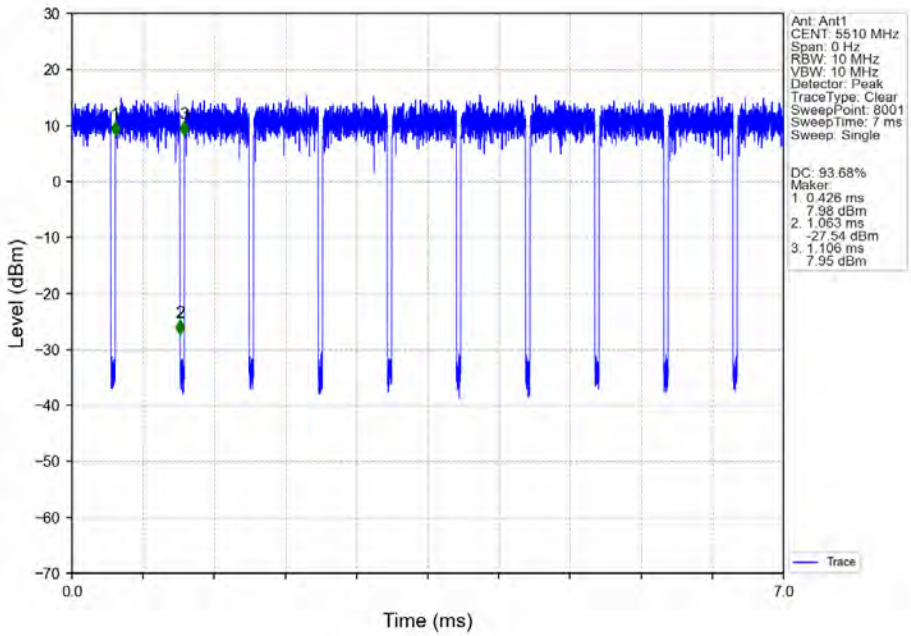
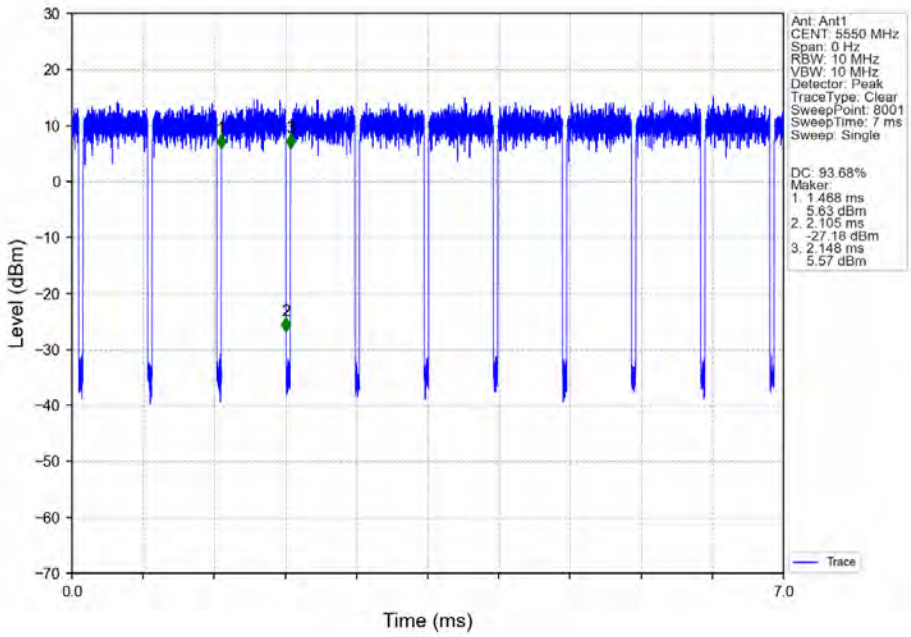
802.11n(HT40)_LCH_5510MHz_Ant1_NTNV



802.11n(HT40)_MCH_5550MHz_Ant1_NTNV



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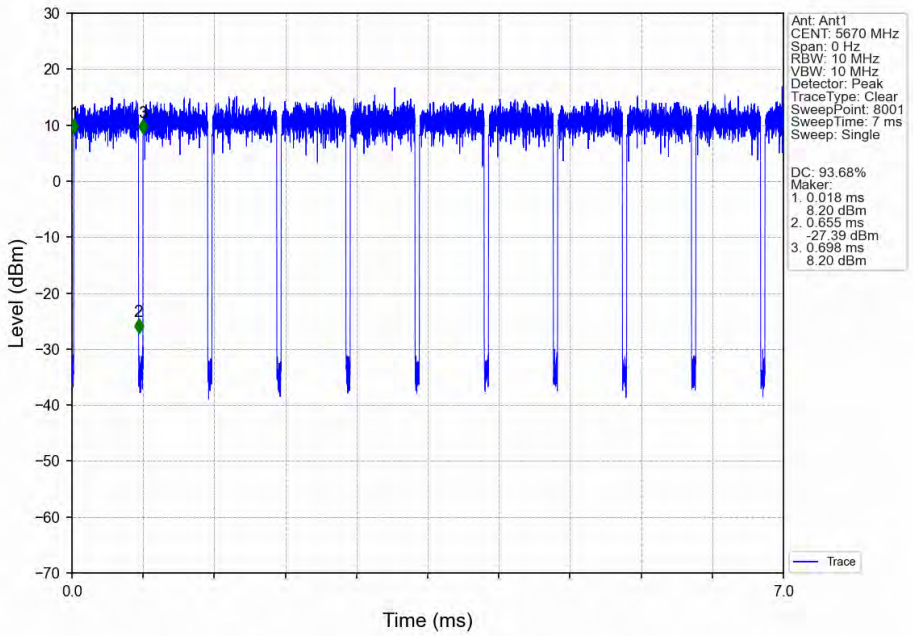
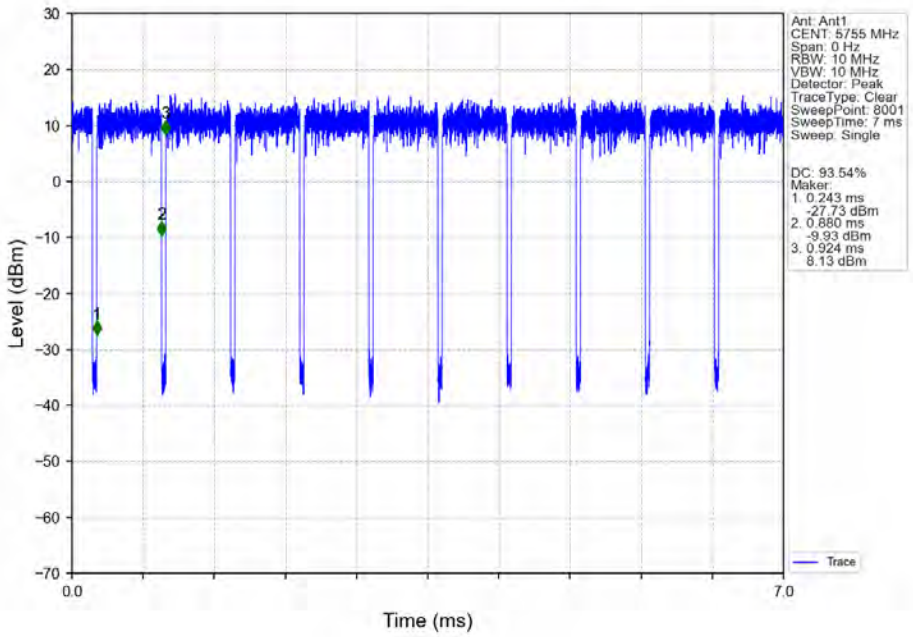
802.11n(HT40)_HCH_5670MHz_Ant1_NTNV



802.11n(HT40)_LCH_5755MHz_Ant1_NTNV



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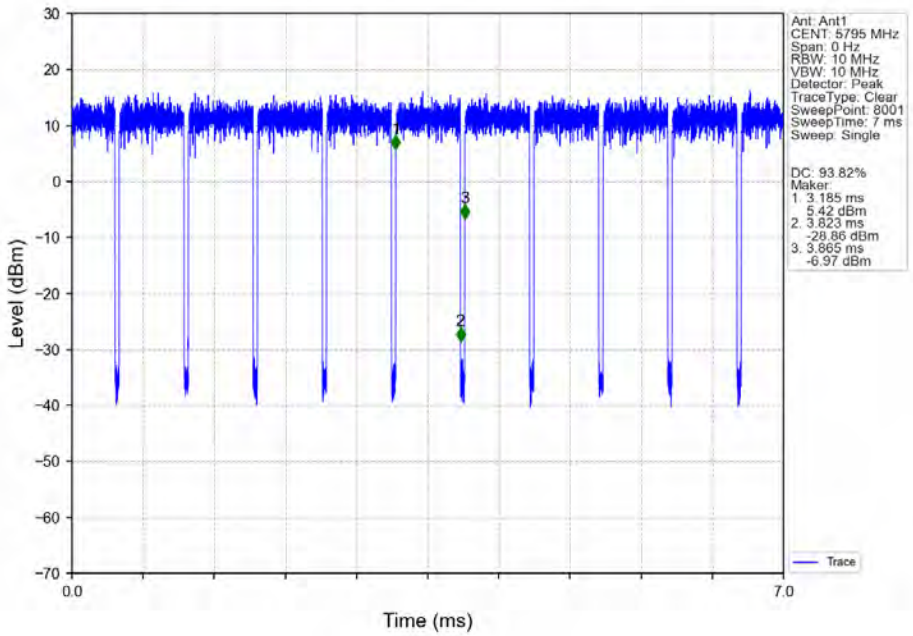
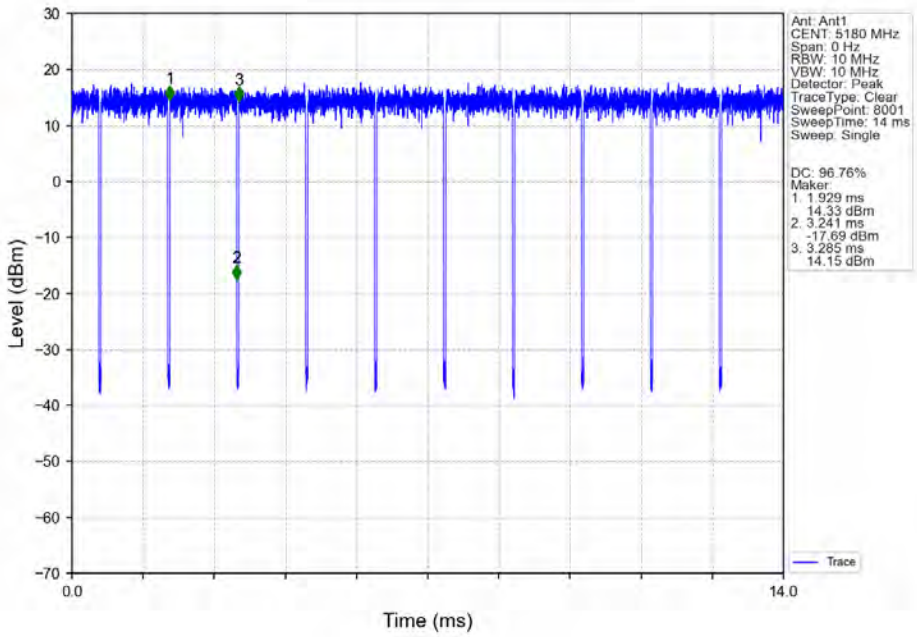
802.11n(HT40)_HCH_5795MHz_Ant1_NTNV



802.11ac(VHT20)_LCH_5180MHz_Ant1_NTNV



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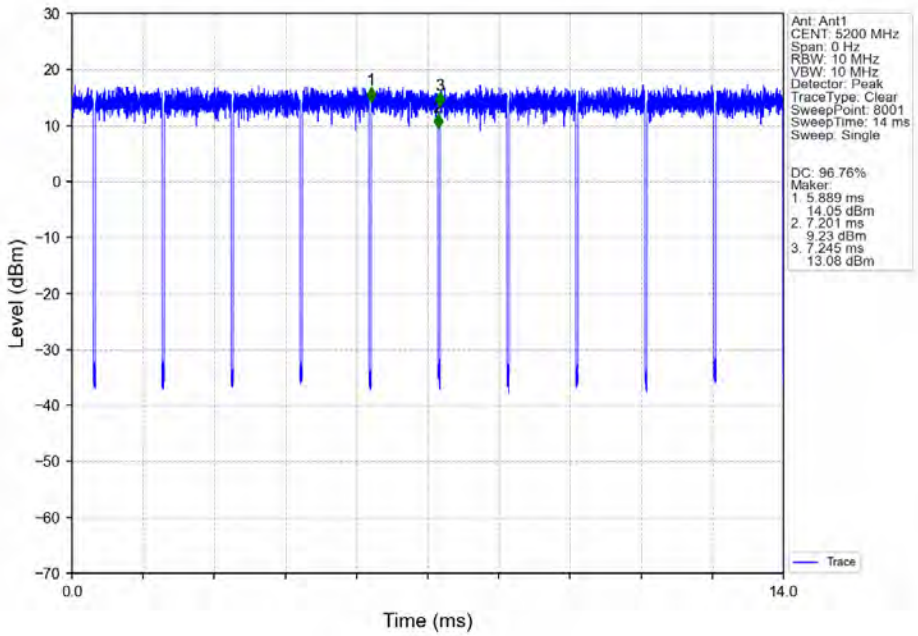
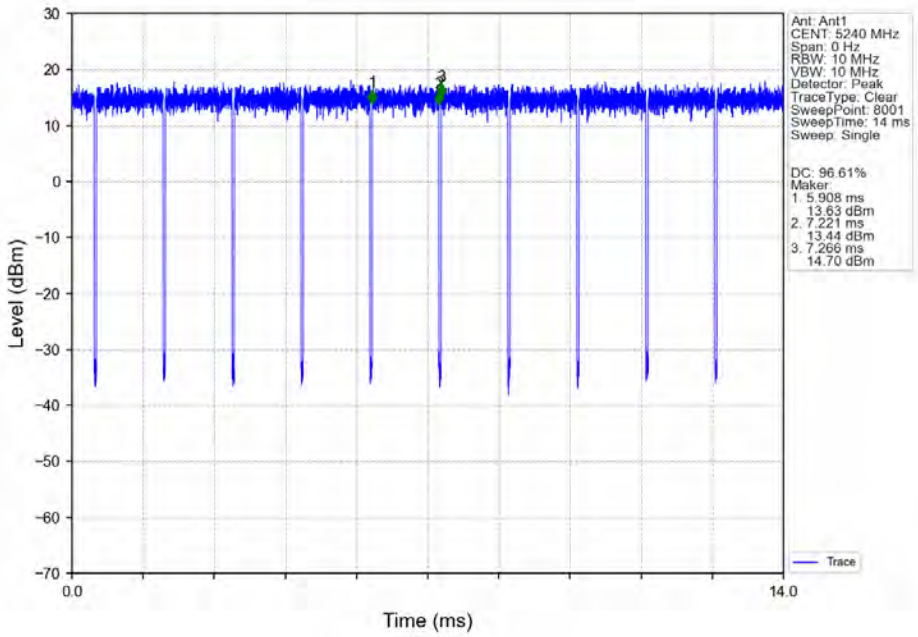
802.11ac(VHT20)_MCH_5200MHz_Ant1_NTNV



802.11ac(VHT20)_HCH_5240MHz_Ant1_NTNV



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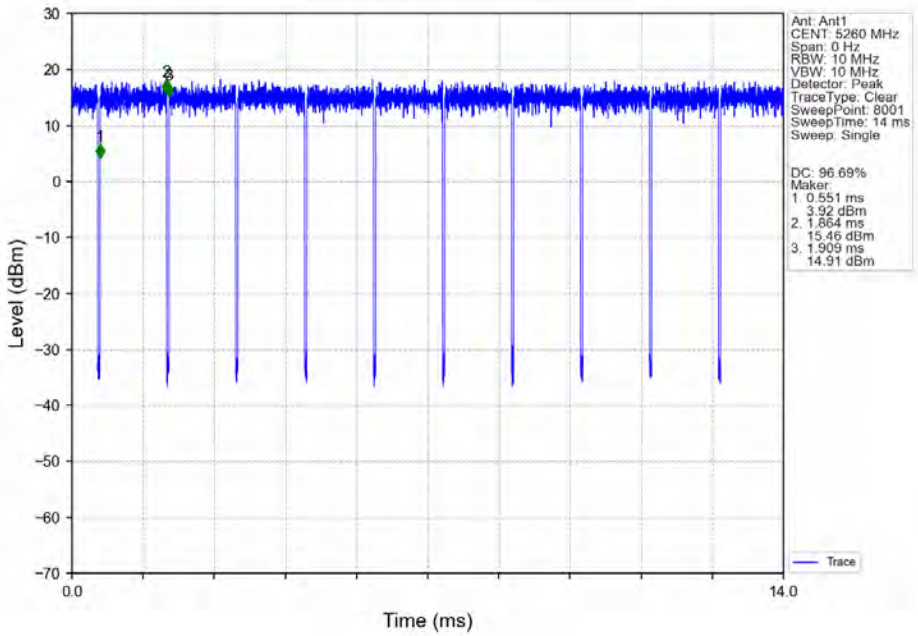
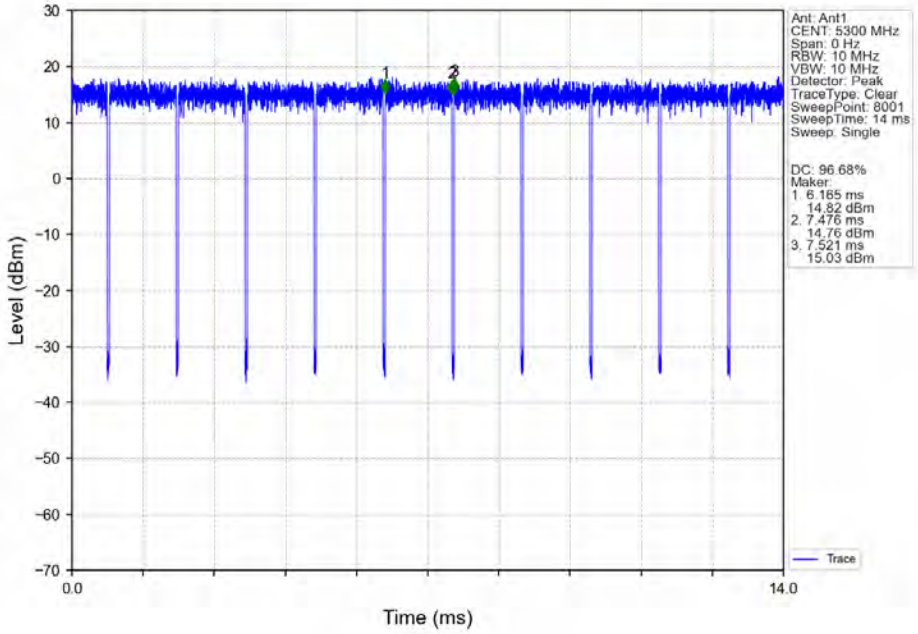
802.11ac(VHT20)_LCH_5260MHz_Ant1_NTNV



802.11ac(VHT20)_MCH_5300MHz_Ant1_NTNV



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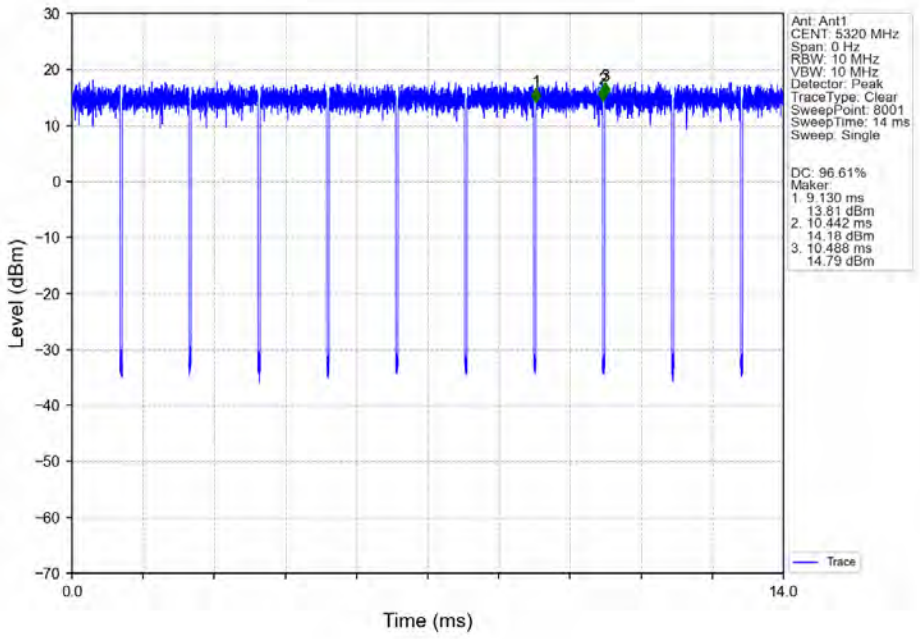
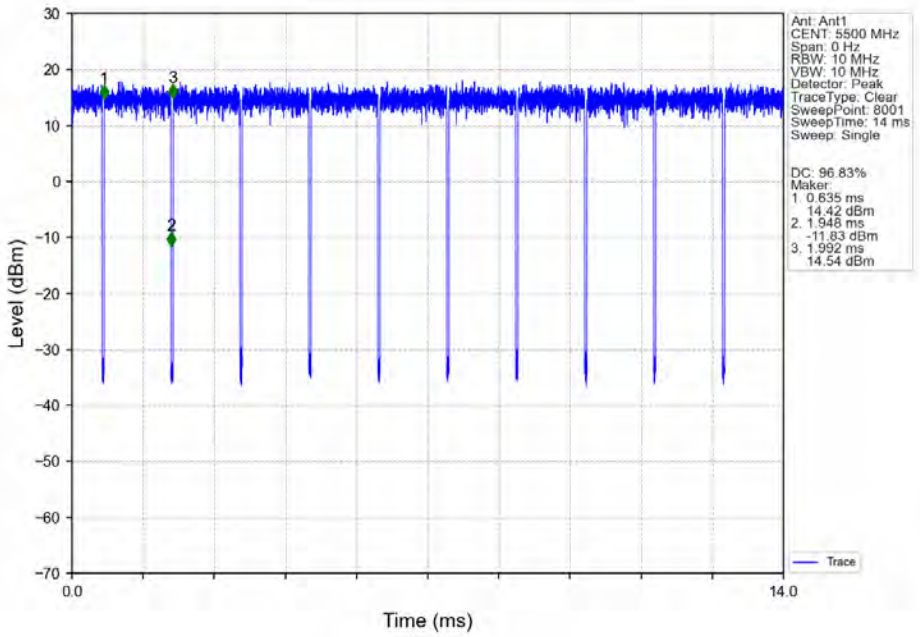
802.11ac(VHT20)_HCH_5320MHz_Ant1_NTNV



802.11ac(VHT20)_LCH_5500MHz_Ant1_NTNV



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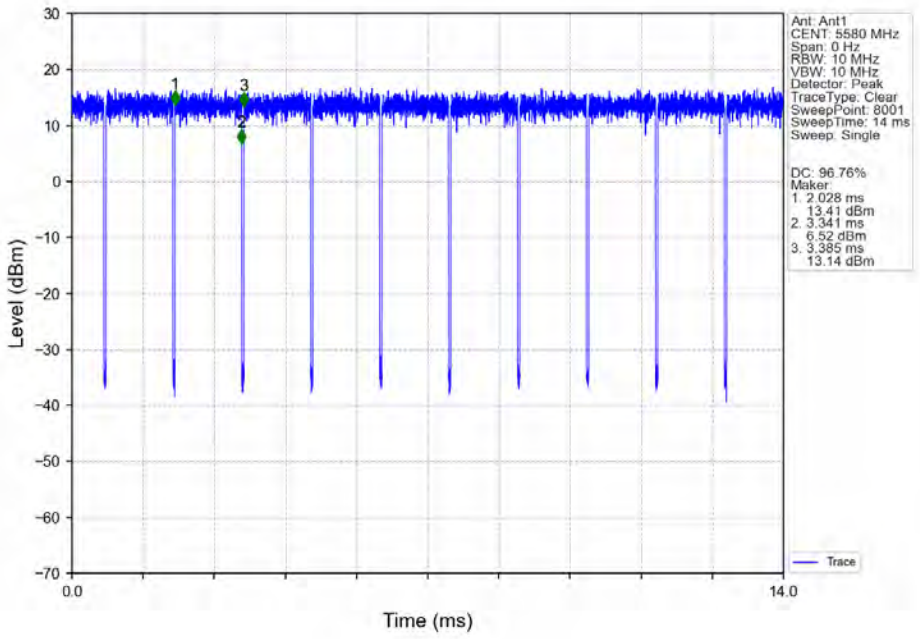
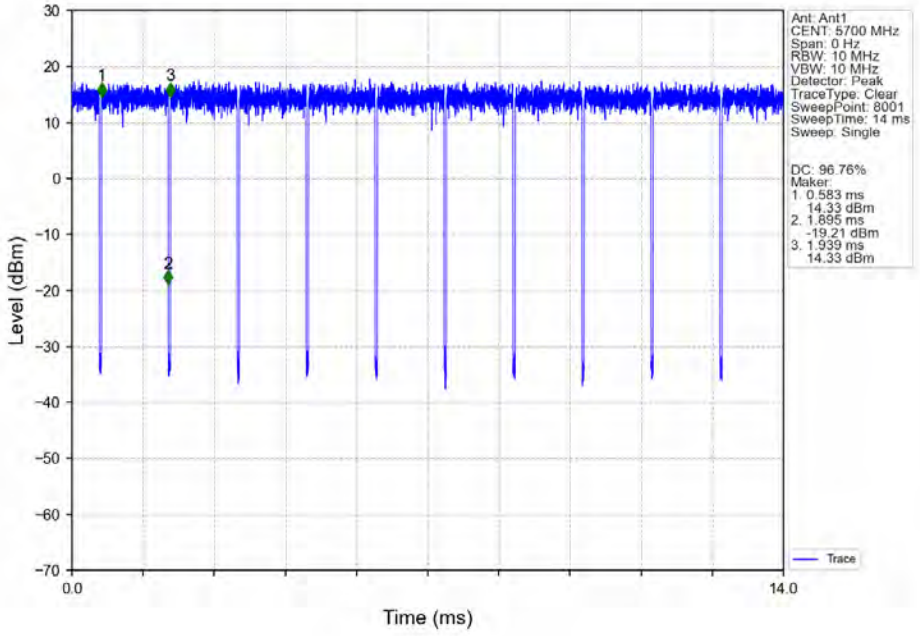
802.11ac(VHT20)_MCH_5580MHz_Ant1_NTNV



802.11ac(VHT20)_HCH_5700MHz_Ant1_NTNV



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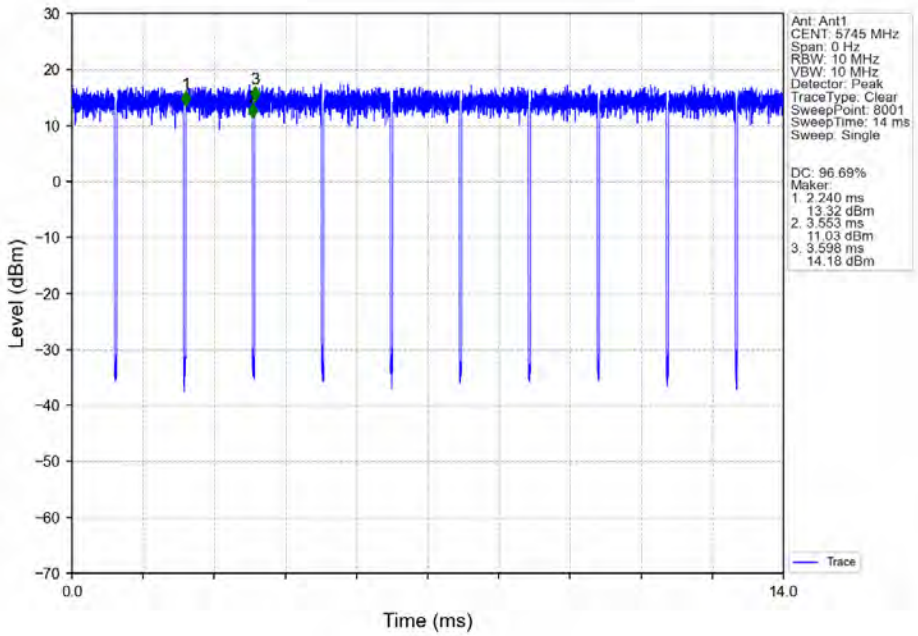
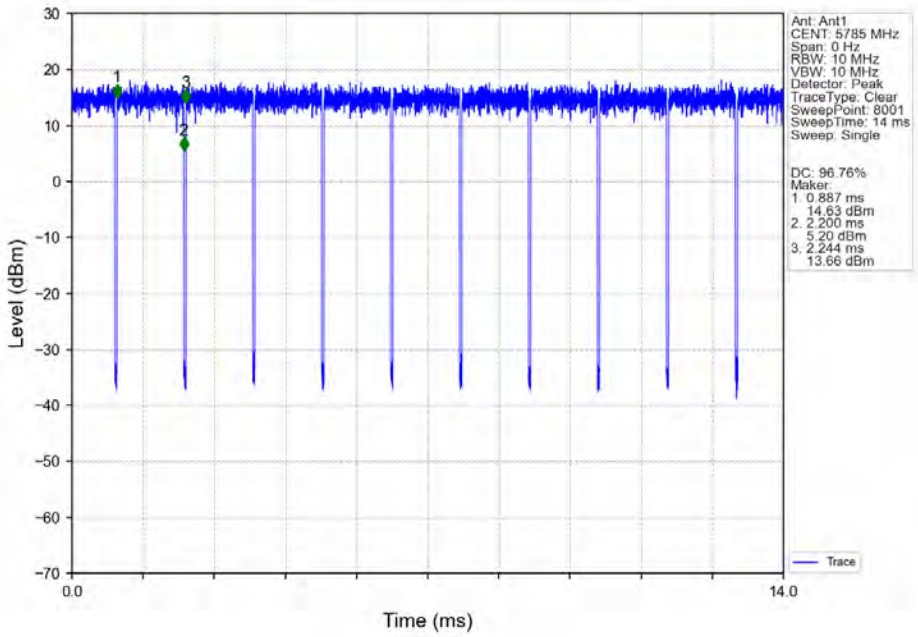
802.11ac(VHT20)_LCH_5745MHz_Ant1_NTNV



802.11ac(VHT20)_MCH_5785MHz_Ant1_NTNV



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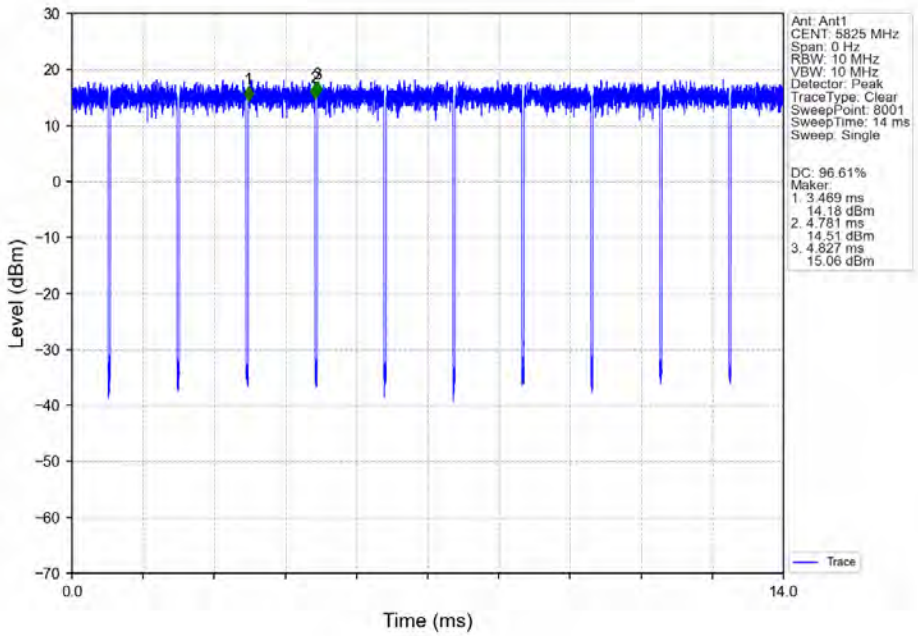
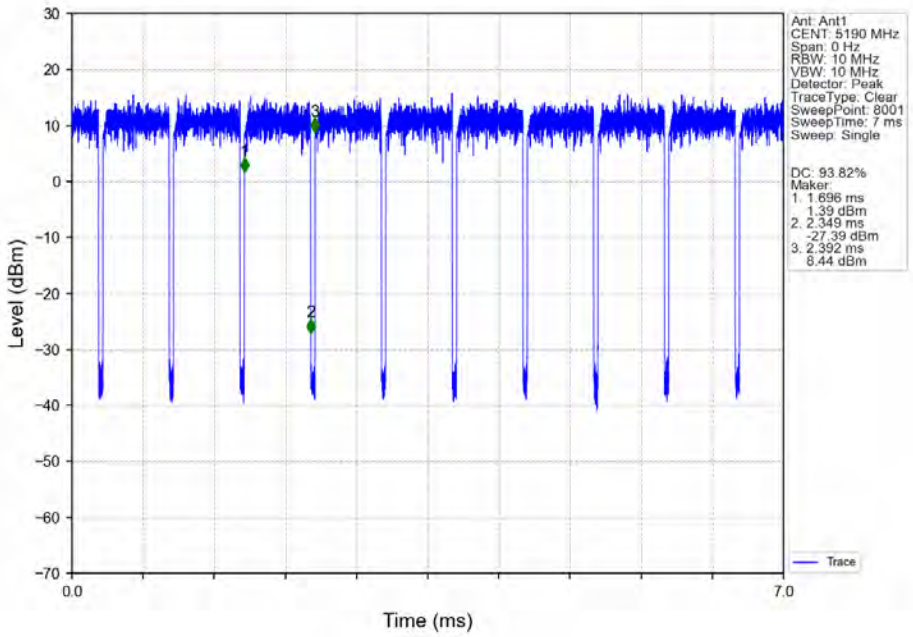
802.11ac(VHT20)_HCH_5825MHz_Ant1_NTNV



802.11ac(VHT40)_LCH_5190MHz_Ant1_NTNV



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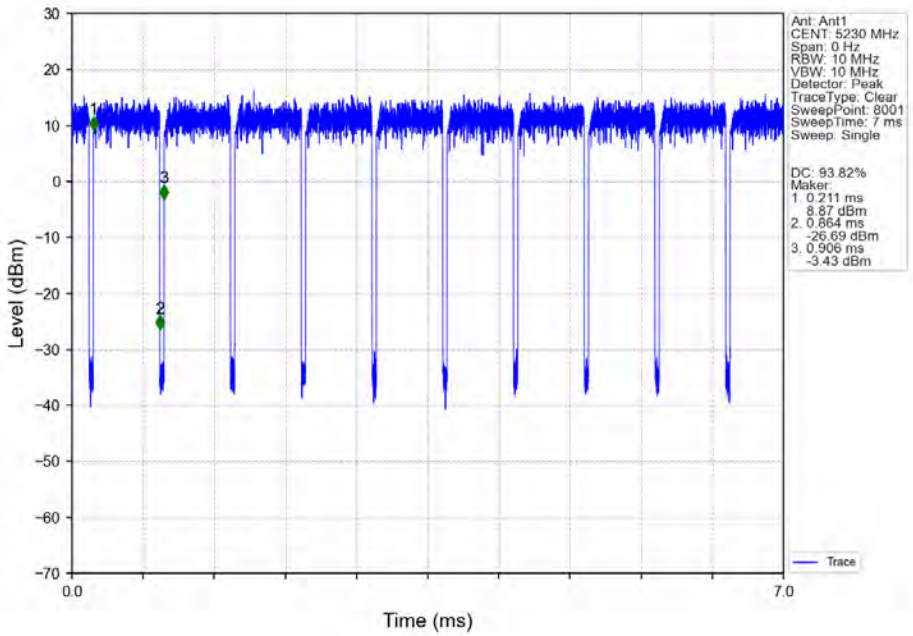
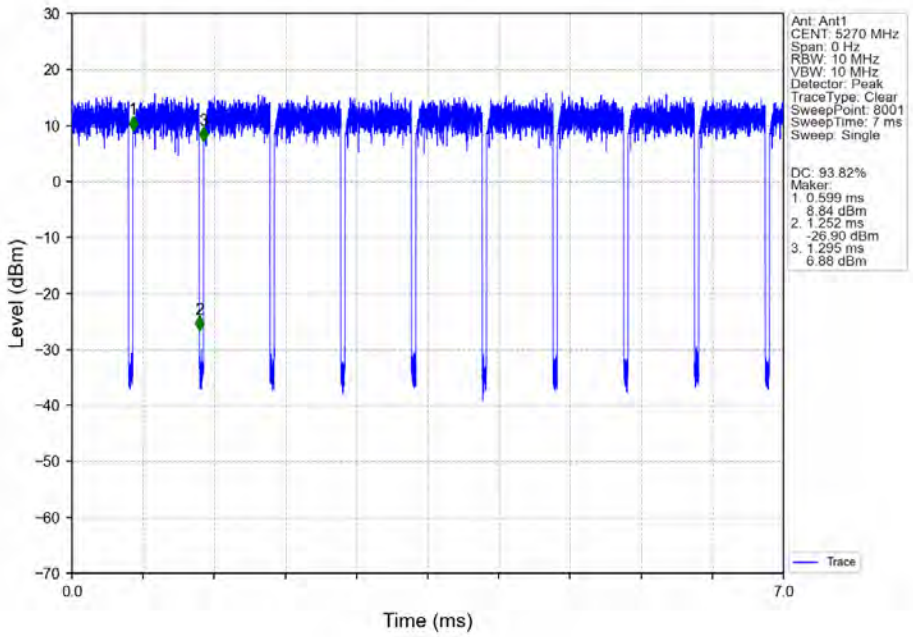
802.11ac(VHT40)_HCH_5230MHz_Ant1_NTNV



802.11ac(VHT40)_LCH_5270MHz_Ant1_NTNV



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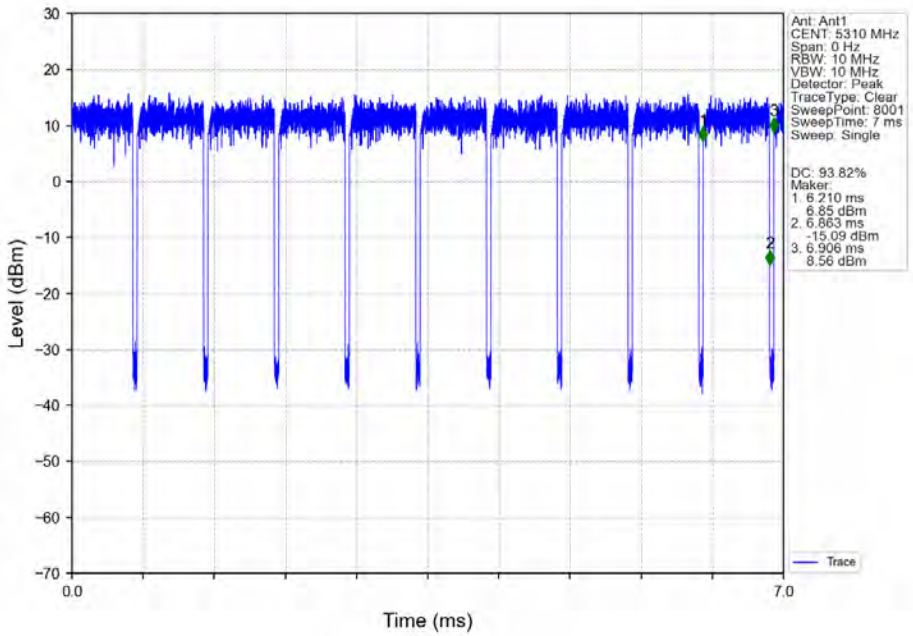
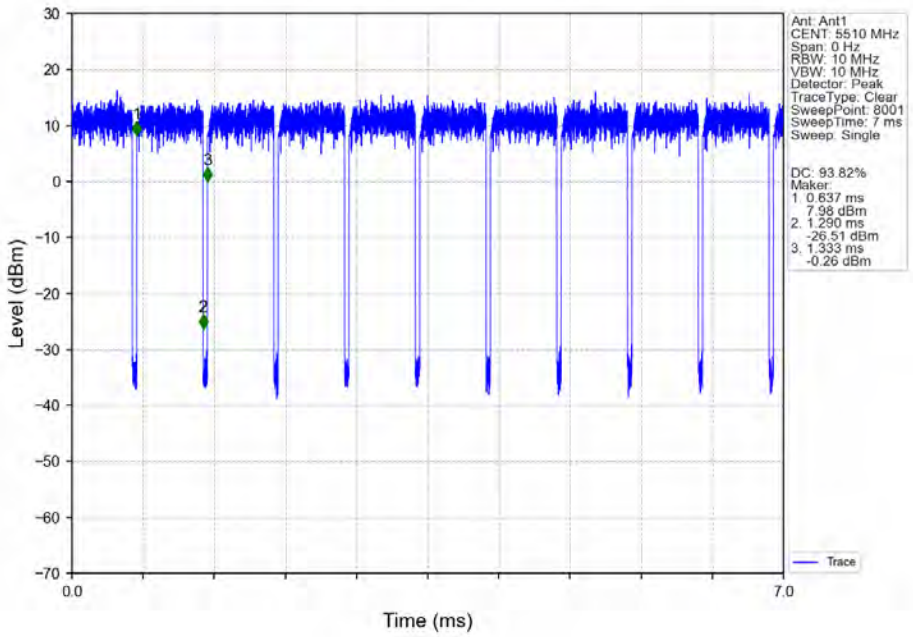
802.11ac(VHT40)_HCH_5310MHz_Ant1_NTNV



802.11ac(VHT40)_LCH_5510MHz_Ant1_NTNV



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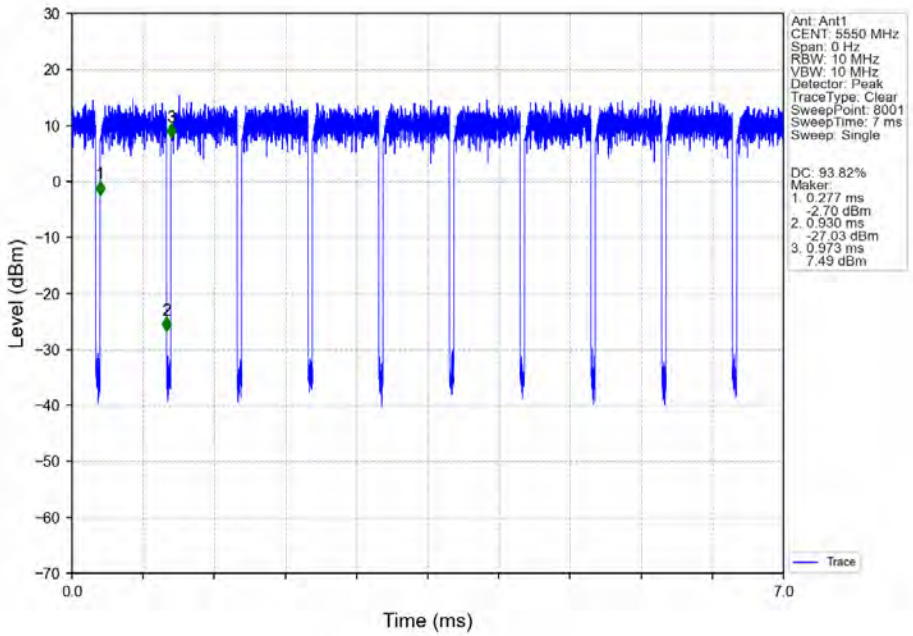
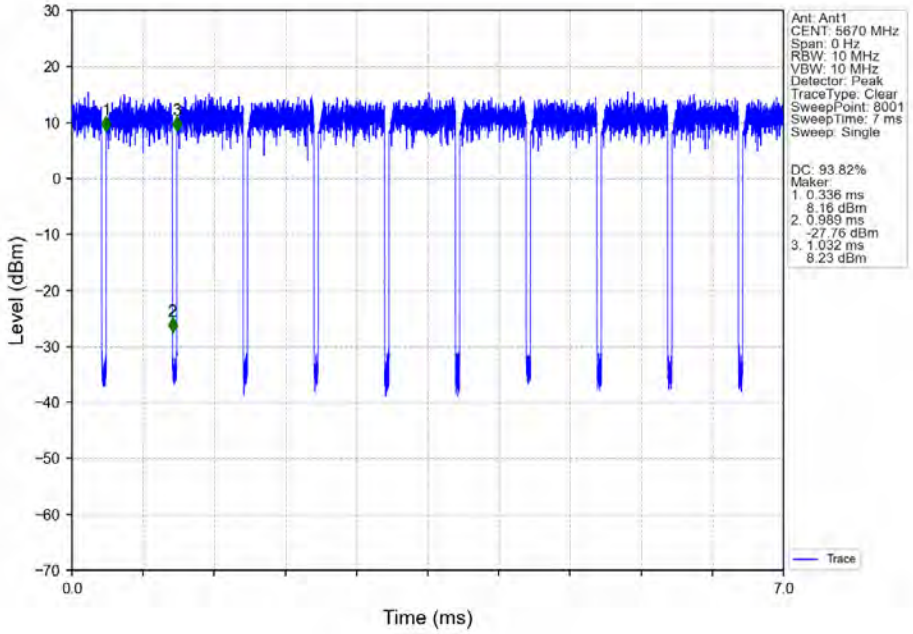
802.11ac(VHT40)_MCH_5550MHz_Ant1_NTNV



802.11ac(VHT40)_HCH_5670MHz_Ant1_NTNV



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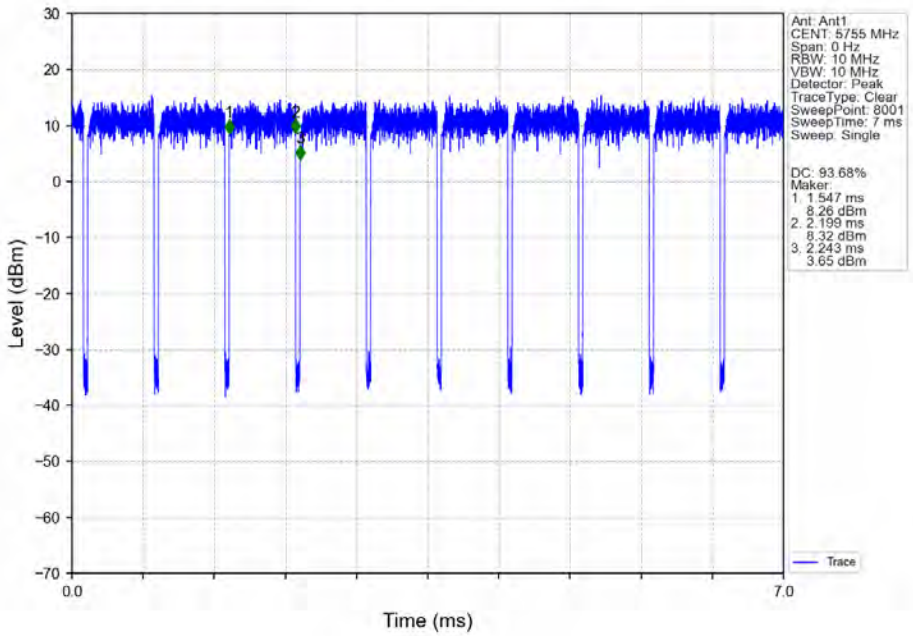
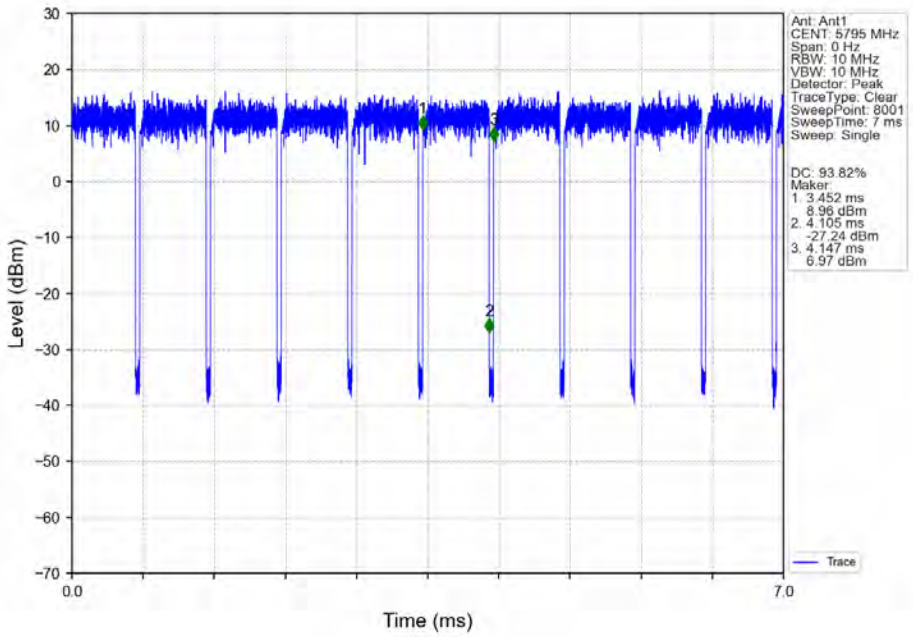
802.11ac(VHT40)_LCH_5755MHz_Ant1_NTNV



802.11ac(VHT40)_HCH_5795MHz_Ant1_NTNV



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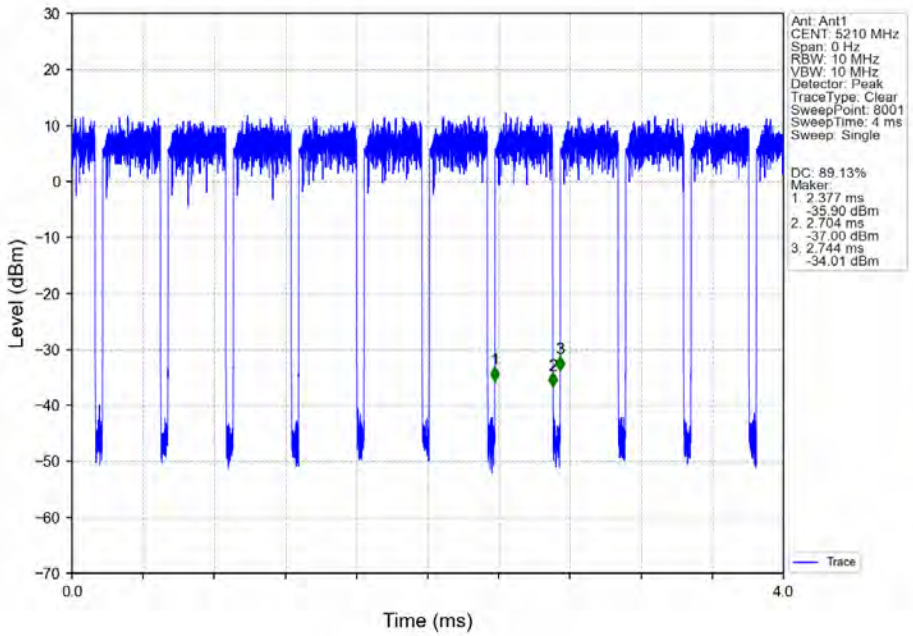
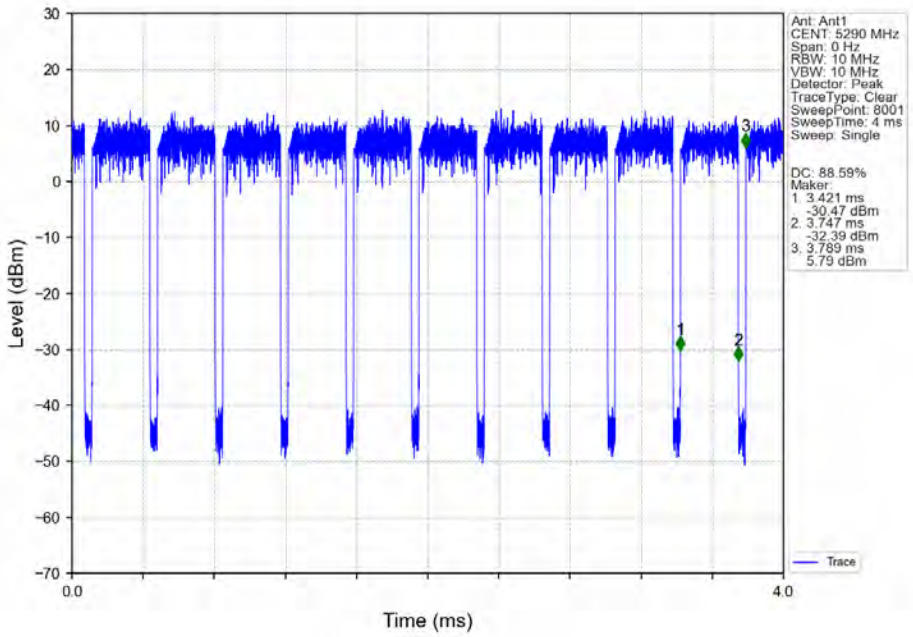
802.11ac(VHT80)_MCH_5210MHz_Ant1_NTNV



802.11ac(VHT80)_MCH_5290MHz_Ant1_NTNV



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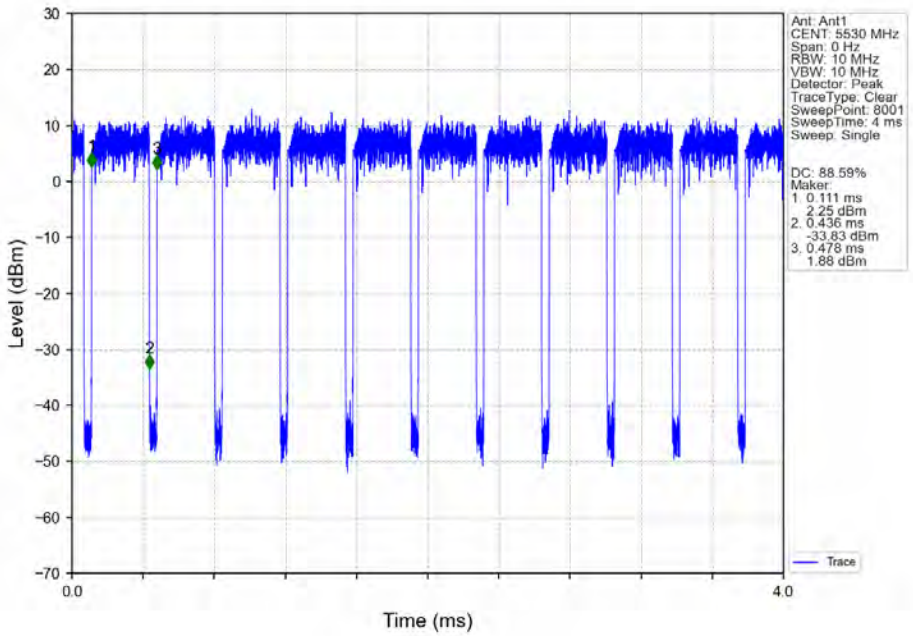
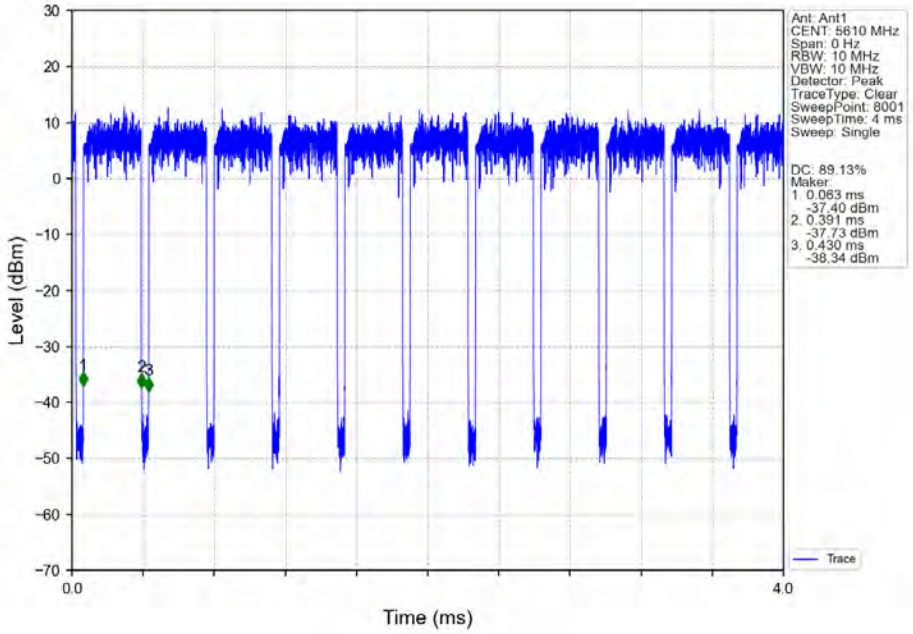
802.11ac(VHT80)_LCH_5530MHz_Ant1_NTNV



802.11ac(VHT80)_HCH_5610MHz_Ant1_NTNV



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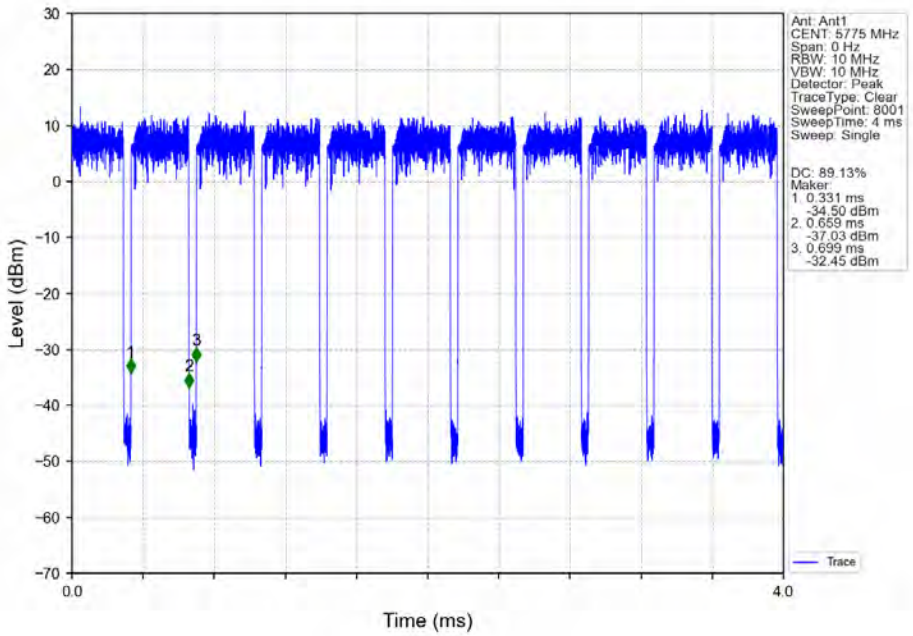
802.11ac(VHT80)_MCH_5775MHz_Ant1_NTNV



2. Bandwidth

2.1 Test Result

2.1.1 OBW

Mode	TX Type	Frequency (MHz)	ANT	99% Occupied Bandwidth (MHz)		Verdict
				Result	Limit	
802.11a	SISO	5180	1	17.864	/	Pass
		5200	1	17.934	/	Pass
		5240	1	17.923	/	Pass
		5260	1	17.981	/	Pass
		5300	1	17.886	/	Pass
		5320	1	17.806	/	Pass
		5500	1	17.783	/	Pass
		5580	1	18.023	/	Pass
		5700	1	18.135	/	Pass
		5745	1	18.108	/	Pass
		5785	1	18.000	/	Pass
		5825	1	18.068	/	Pass
802.11n (HT20)	SISO	5180	1	18.556	/	Pass
		5200	1	18.639	/	Pass
		5240	1	18.656	/	Pass
		5260	1	18.575	/	Pass
		5300	1	18.519	/	Pass
		5320	1	18.551	/	Pass
		5500	1	18.498	/	Pass
		5580	1	18.660	/	Pass
		5700	1	18.715	/	Pass
		5745	1	18.716	/	Pass
		5785	1	18.670	/	Pass
		5825	1	18.716	/	Pass
802.11n (HT40)	SISO	5190	1	36.518	/	Pass
		5230	1	36.579	/	Pass
		5270	1	36.637	/	Pass
		5310	1	36.583	/	Pass
		5510	1	36.586	/	Pass
		5550	1	36.641	/	Pass
		5670	1	36.704	/	Pass
		5755	1	36.783	/	Pass
		5795	1	36.675	/	Pass
802.11ac (VHT20)	SISO	5180	1	18.568	/	Pass
		5200	1	18.655	/	Pass
		5240	1	18.618	/	Pass
		5260	1	18.544	/	Pass
		5300	1	18.623	/	Pass
		5320	1	18.530	/	Pass
		5500	1	18.434	/	Pass
		5580	1	18.656	/	Pass
		5700	1	18.758	/	Pass

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		5745	1	18.789	/	Pass
		5785	1	18.703	/	Pass
		5825	1	18.747	/	Pass
802.11ac (VHT40)	SISO	5190	1	36.613	/	Pass
		5230	1	36.608	/	Pass
		5270	1	36.517	/	Pass
		5310	1	36.527	/	Pass
		5510	1	36.527	/	Pass
		5550	1	36.509	/	Pass
		5670	1	36.717	/	Pass
		5755	1	36.816	/	Pass
		5795	1	36.830	/	Pass
802.11ac (VHT80)	SISO	5210	1	76.206	/	Pass
		5290	1	76.300	/	Pass
		5530	1	76.279	/	Pass
		5610	1	76.260	/	Pass
		5775	1	76.196	/	Pass

2.1.2 6dB BW

Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
802.11a	SISO	5745	1	15.178	>=0.5	Pass
		5785	1	15.185	>=0.5	Pass
		5825	1	15.528	>=0.5	Pass
802.11n (HT20)	SISO	5745	1	15.180	>=0.5	Pass
		5785	1	15.174	>=0.5	Pass
		5825	1	15.183	>=0.5	Pass
802.11n (HT40)	SISO	5755	1	35.167	>=0.5	Pass
		5795	1	35.133	>=0.5	Pass
802.11ac (VHT20)	SISO	5745	1	15.185	>=0.5	Pass
		5785	1	15.159	>=0.5	Pass
		5825	1	15.176	>=0.5	Pass
802.11ac (VHT40)	SISO	5755	1	35.169	>=0.5	Pass
		5795	1	35.158	>=0.5	Pass
802.11ac (VHT80)	SISO	5775	1	75.127	>=0.5	Pass

2.1.3 26dB BW

Mode	TX Type	Frequency (MHz)	ANT	26dB Bandwidth (MHz)		Verdict
				Result	Limit	
802.11a	SISO	5180	1	20.454	/	Pass
		5200	1	20.517	/	Pass
		5240	1	20.447	/	Pass
		5260	1	20.508	/	Pass
		5300	1	20.522	/	Pass
		5320	1	20.390	/	Pass
		5500	1	20.301	/	Pass
		5580	1	20.439	/	Pass
		5700	1	20.475	/	Pass
802.11n	SISO	5180	1	20.705	/	Pass

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(HT20)		5200	1	20.596	/	Pass
		5240	1	20.583	/	Pass
		5260	1	20.695	/	Pass
		5300	1	20.737	/	Pass
		5320	1	20.714	/	Pass
		5500	1	20.619	/	Pass
		5580	1	20.737	/	Pass
		5700	1	20.909	/	Pass
802.11n (HT40)	SISO	5190	1	41.869	/	Pass
		5230	1	41.900	/	Pass
		5270	1	42.018	/	Pass
		5310	1	41.855	/	Pass
		5510	1	41.909	/	Pass
		5550	1	42.094	/	Pass
		5670	1	42.050	/	Pass
802.11ac (VHT20)	SISO	5180	1	20.697	/	Pass
		5200	1	20.588	/	Pass
		5240	1	20.642	/	Pass
		5260	1	20.578	/	Pass
		5300	1	20.639	/	Pass
		5320	1	20.590	/	Pass
		5500	1	20.574	/	Pass
		5580	1	20.739	/	Pass
		5700	1	20.742	/	Pass
802.11ac (VHT40)	SISO	5190	1	41.776	/	Pass
		5230	1	41.858	/	Pass
		5270	1	41.894	/	Pass
		5310	1	41.720	/	Pass
		5510	1	42.001	/	Pass
		5550	1	41.778	/	Pass
		5670	1	42.093	/	Pass
802.11ac (VHT80)	SISO	5210	1	81.686	/	Pass
		5290	1	81.720	/	Pass
		5530	1	81.903	/	Pass
		5610	1	81.694	/	Pass

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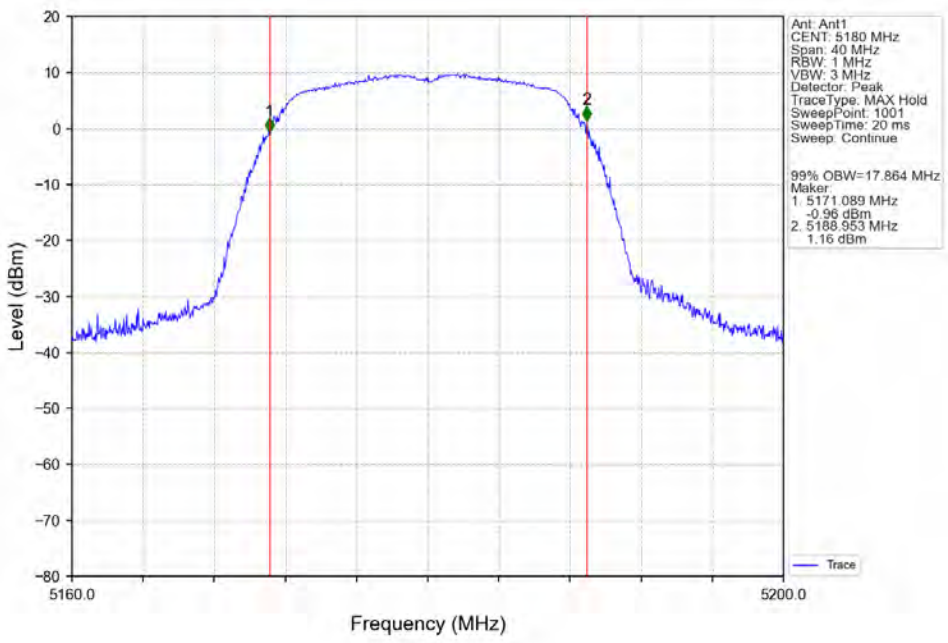
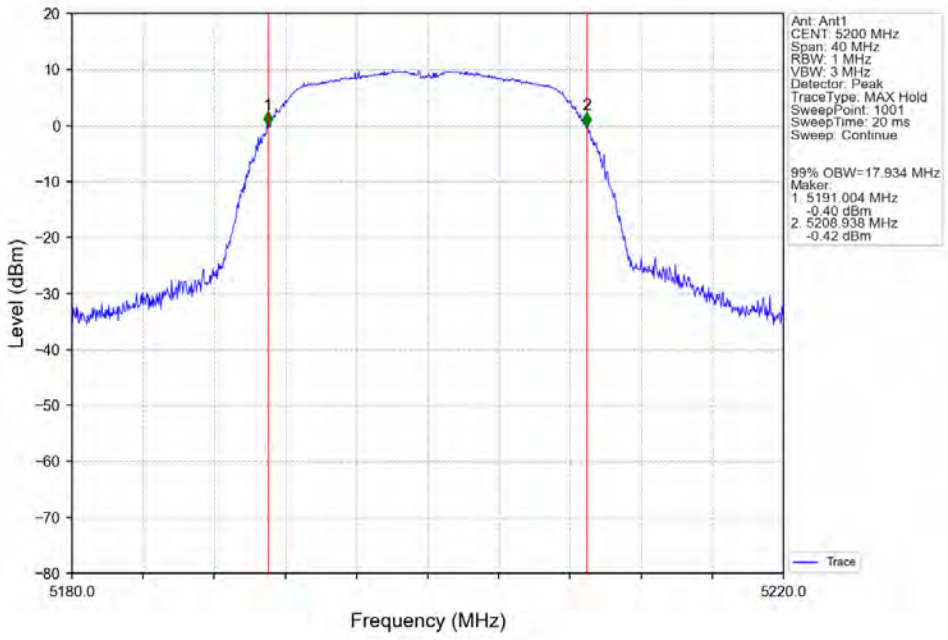
2.2 Test Graph

2.2.1 OBW

802.11a_LCH_5180MHz_Ant1_NTNV



802.11a_MCH_5200MHz_Ant1_NTNV



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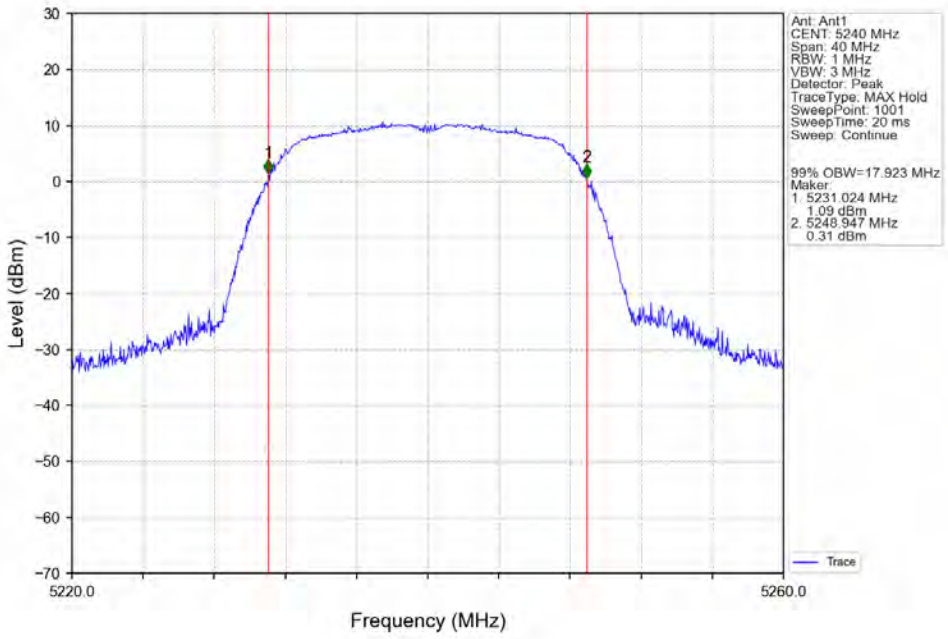
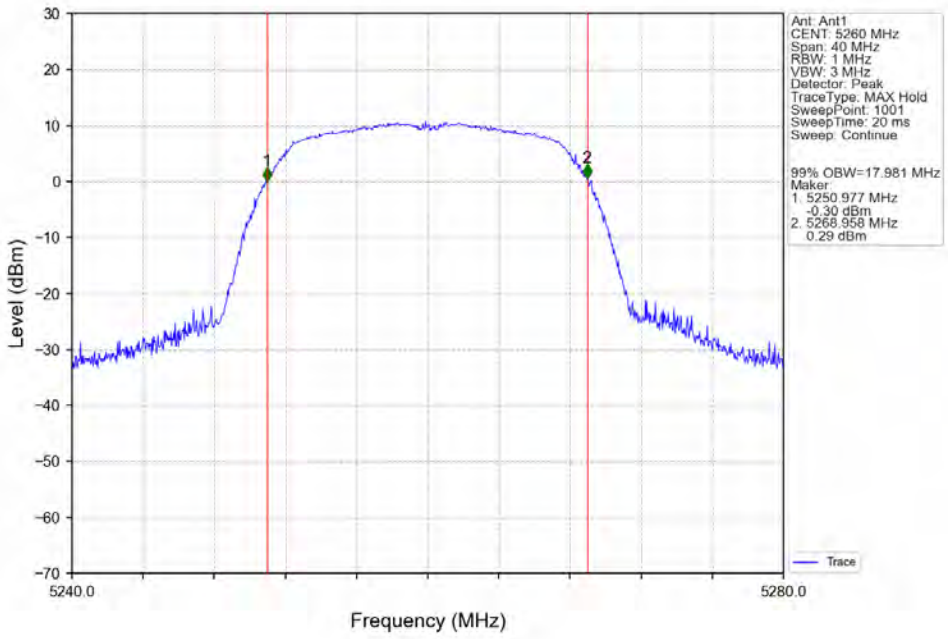
802.11a_HCH_5240MHz_Ant1_NTNV



802.11a_LCH_5260MHz_Ant1_NTNV



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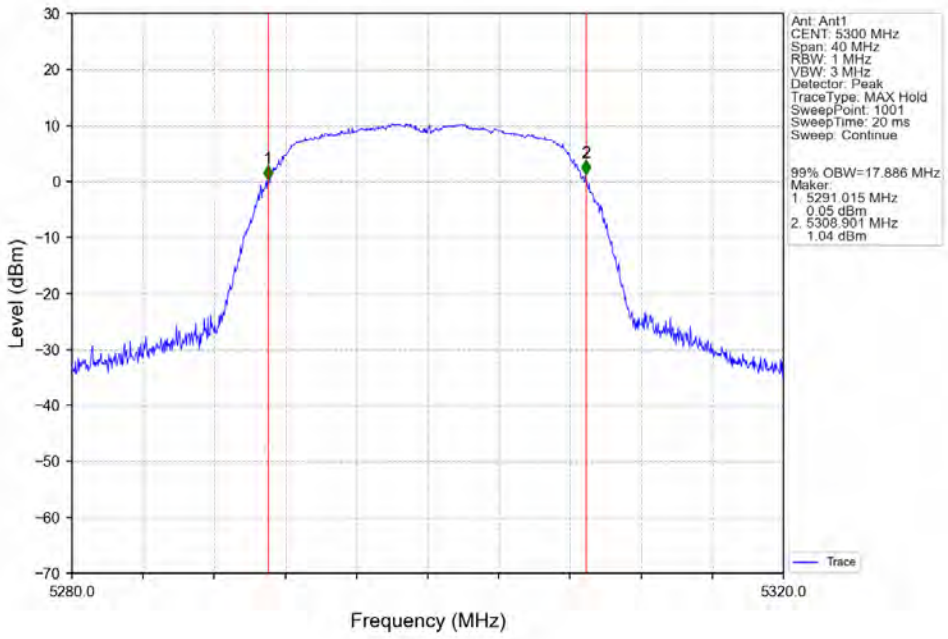
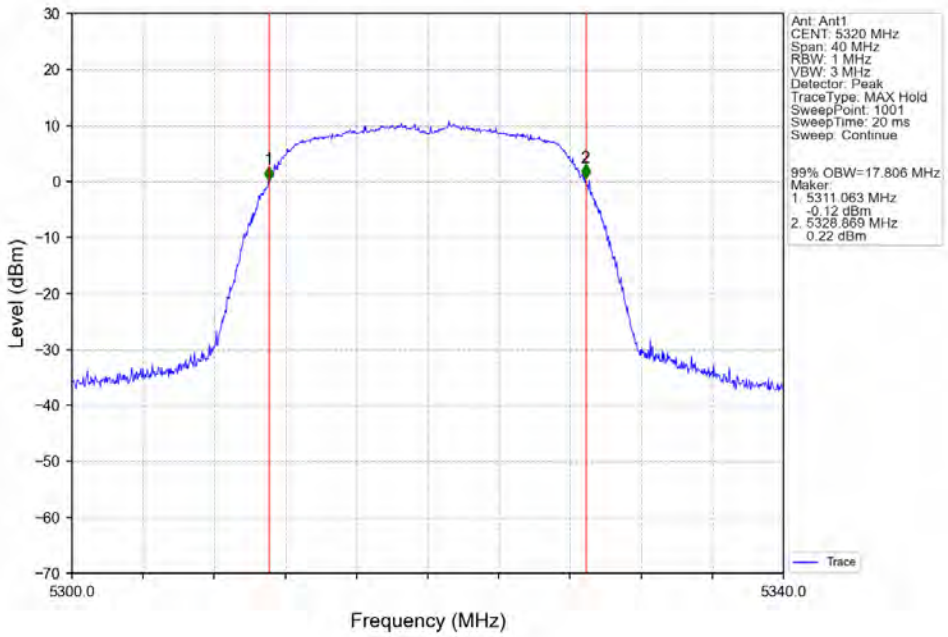
802.11a_MCH_5300MHz_Ant1_NTNV



802.11a_HCH_5320MHz_Ant1_NTNV



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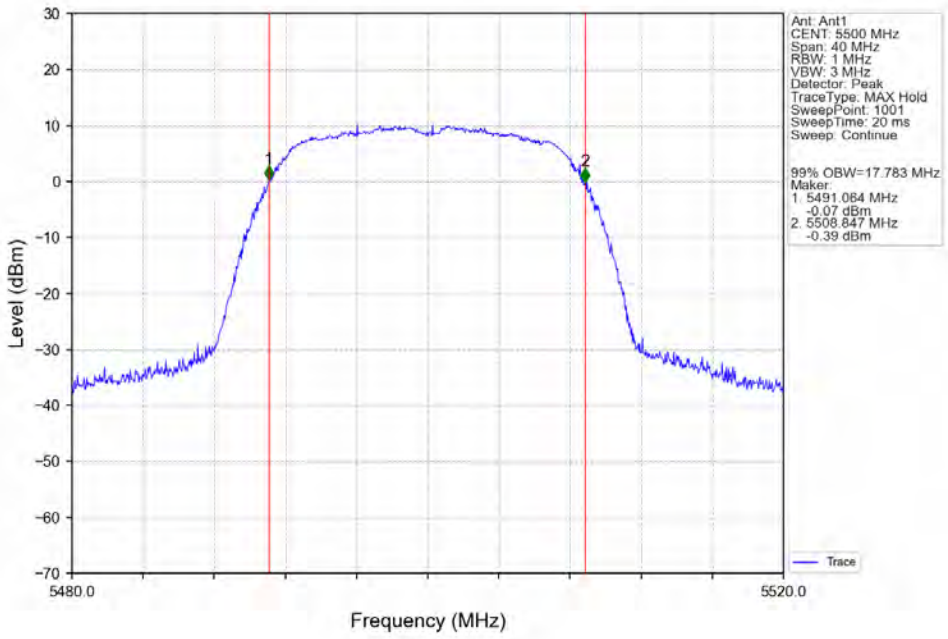
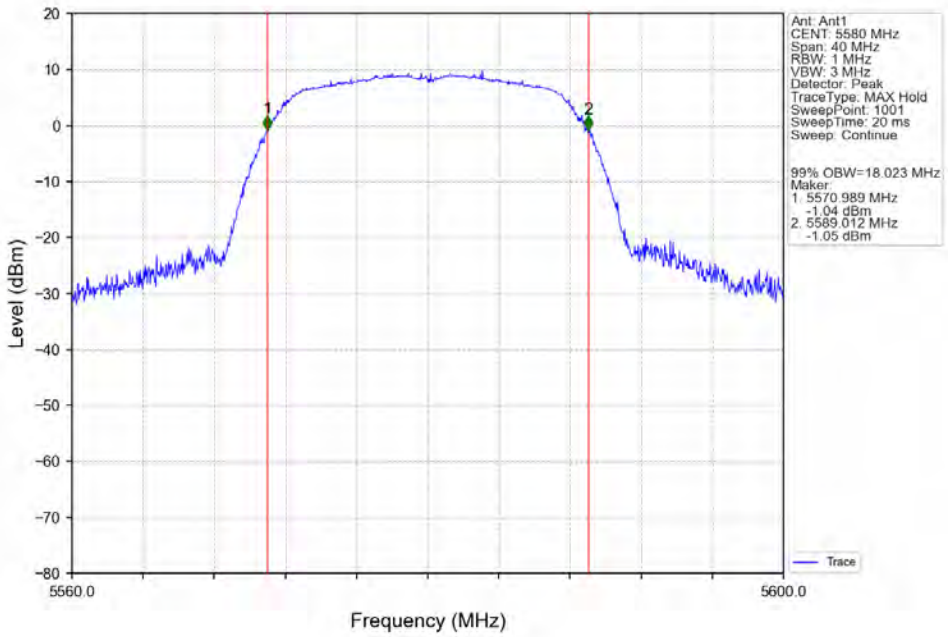
802.11a_LCH_5500MHz_Ant1_NTNV



802.11a_MCH_5580MHz_Ant1_NTNV



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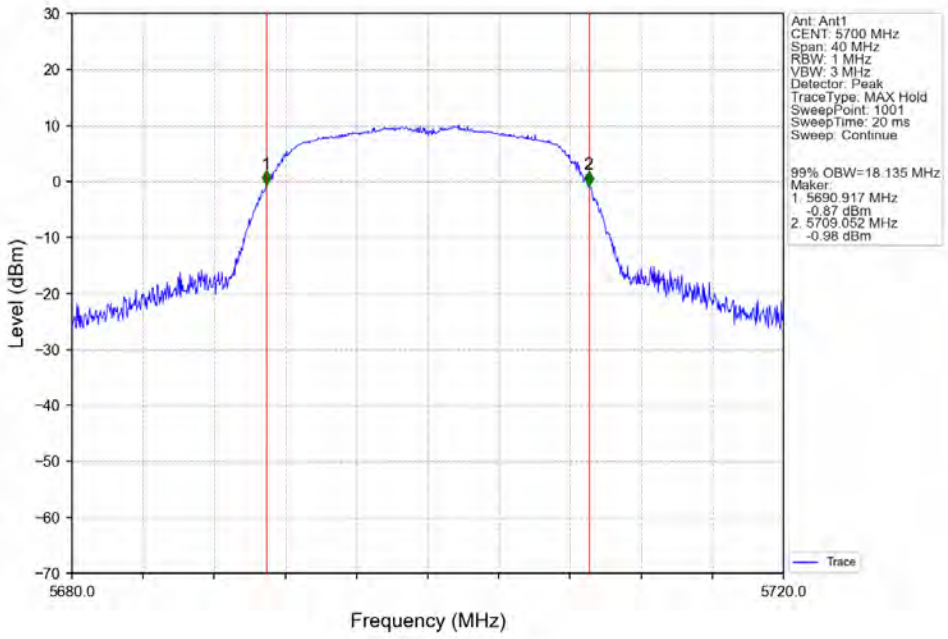
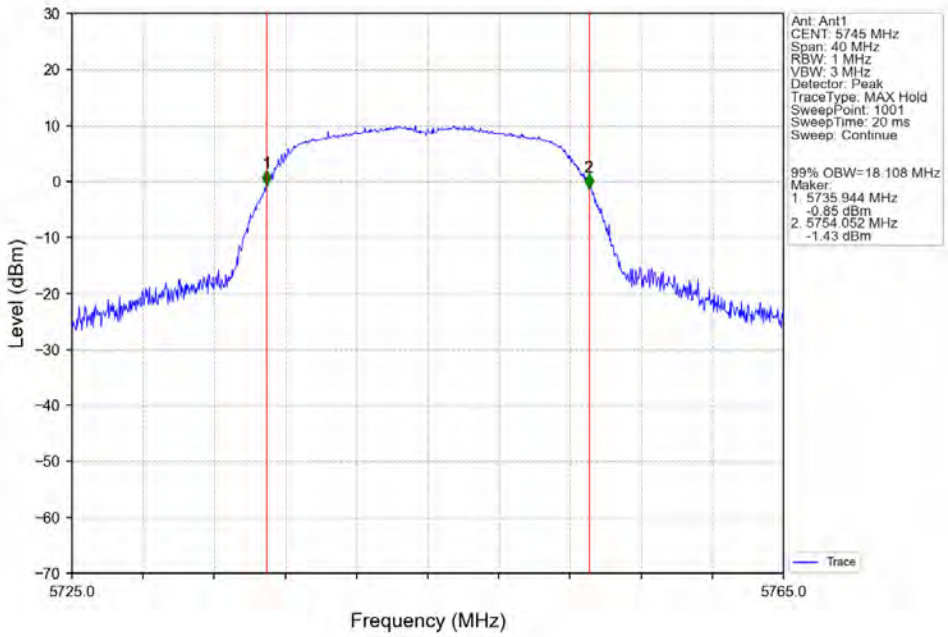
802.11a_HCH_5700MHz_Ant1_NTNV



802.11a_LCH_5745MHz_Ant1_NTNV



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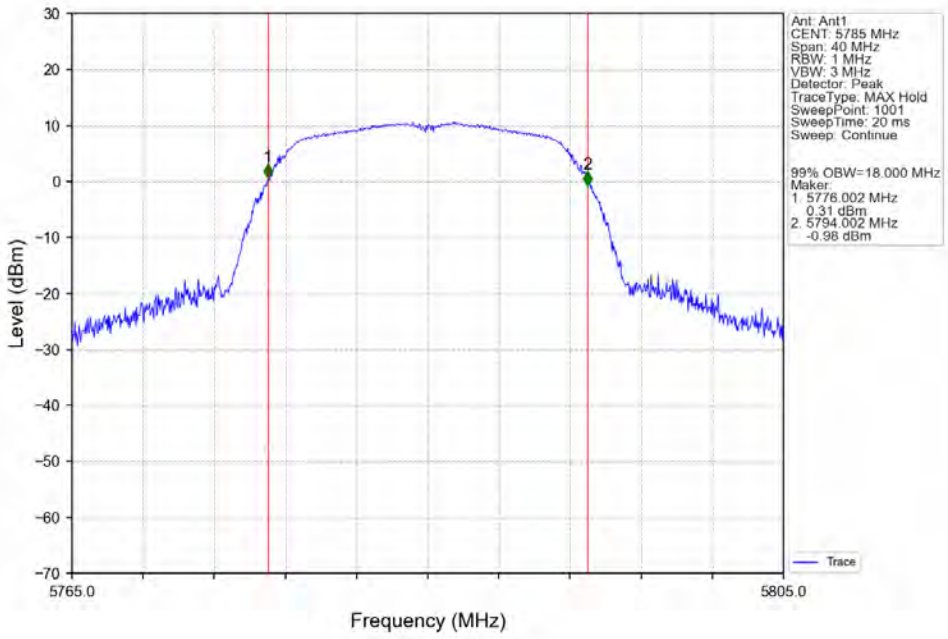
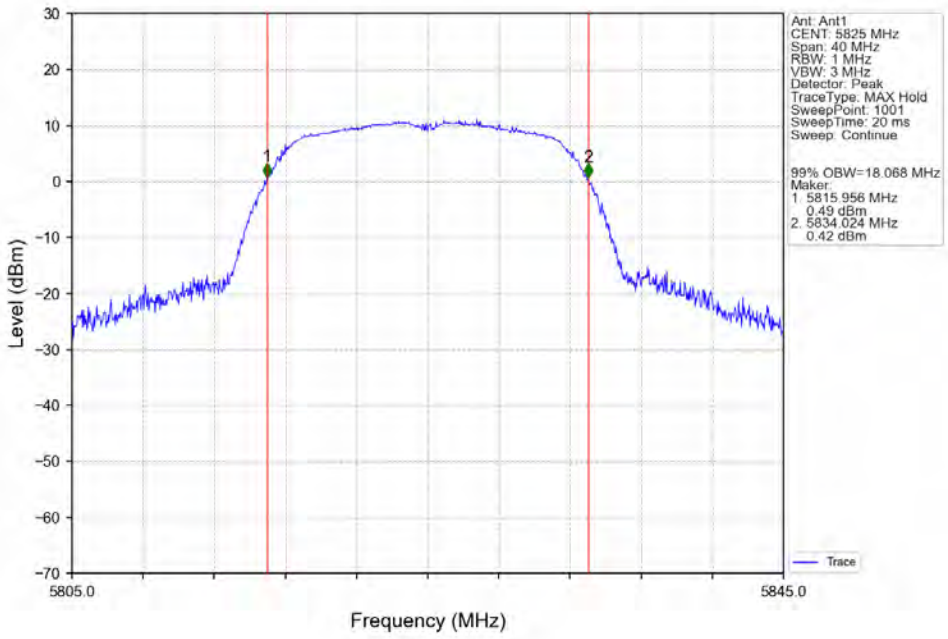
802.11a_MCH_5785MHz_Ant1_NTNV



802.11a_HCH_5825MHz_Ant1_NTNV



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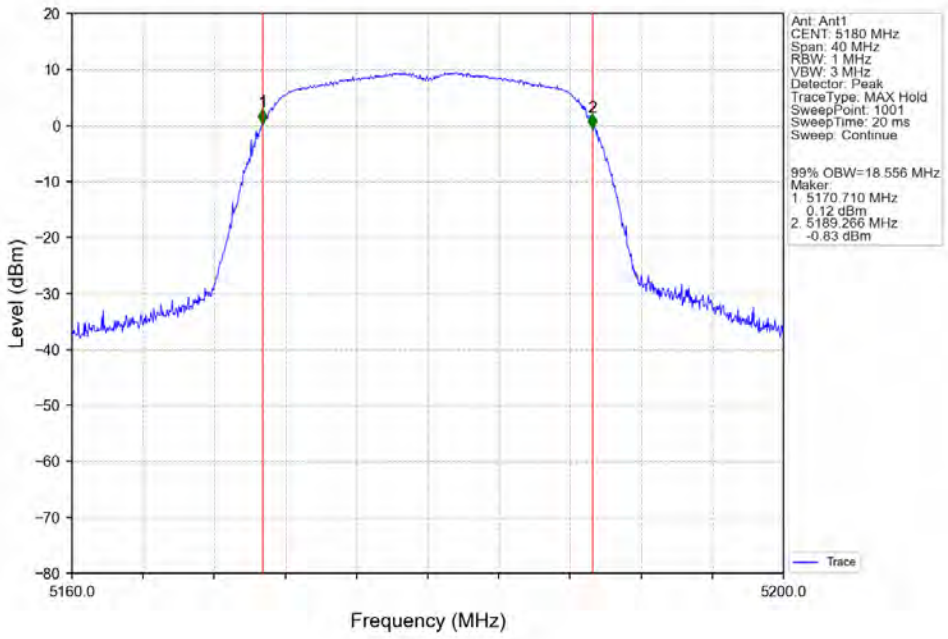
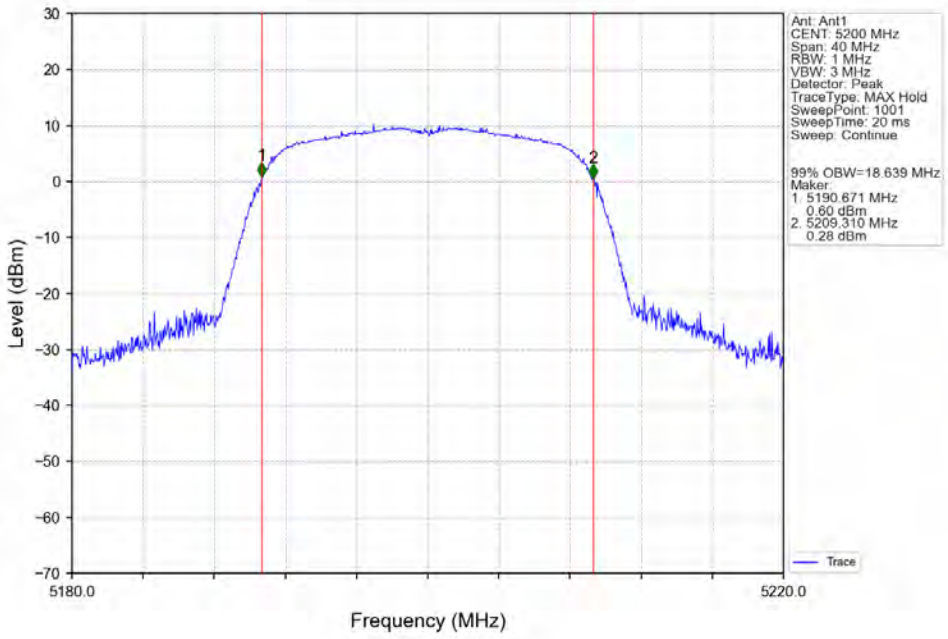
802.11n(HT20)_LCH_5180MHz_Ant1_NTNV



802.11n(HT20)_MCH_5200MHz_Ant1_NTNV



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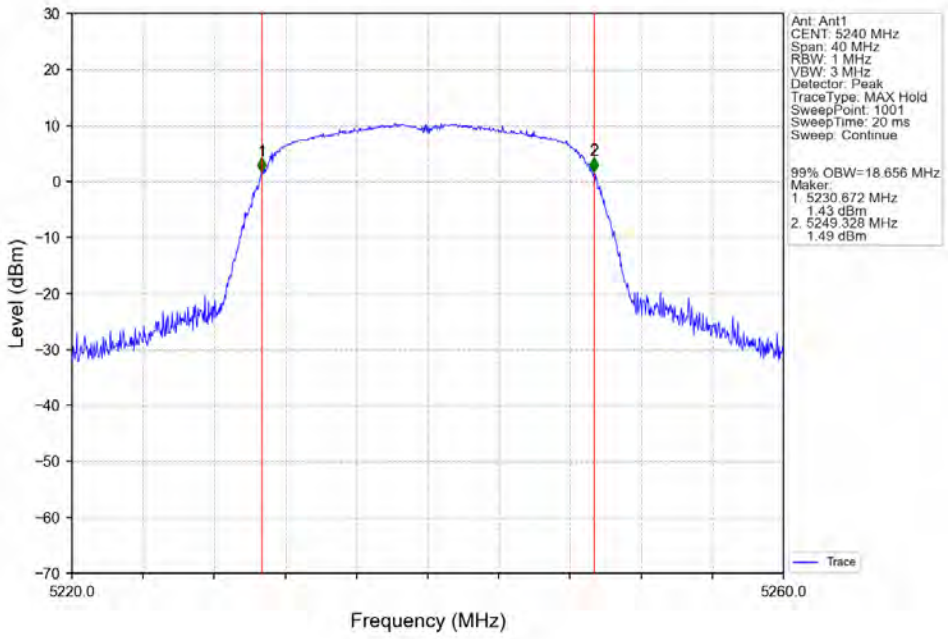
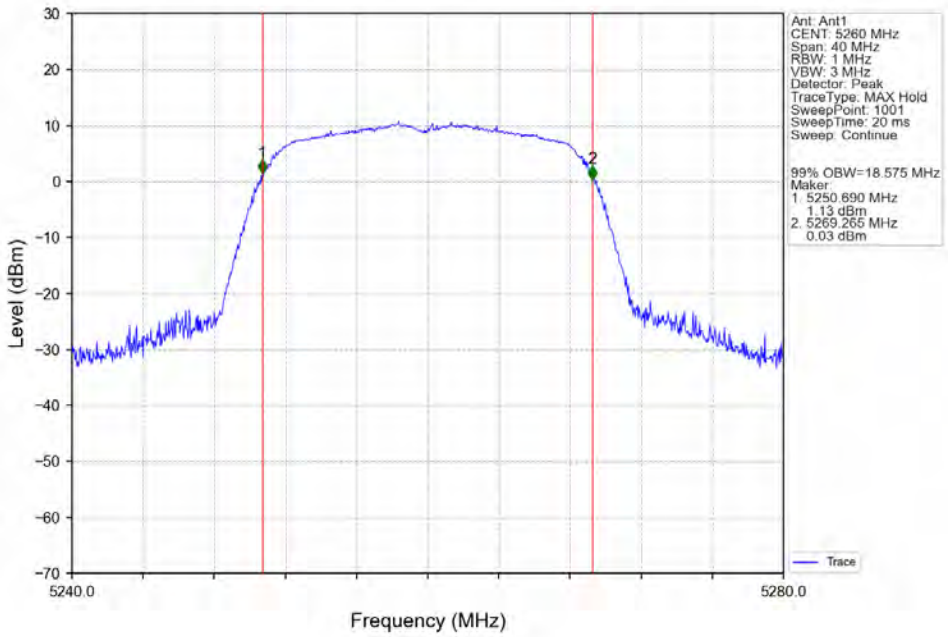
802.11n(HT20)_HCH_5240MHz_Ant1_NTNV



802.11n(HT20)_LCH_5260MHz_Ant1_NTNV



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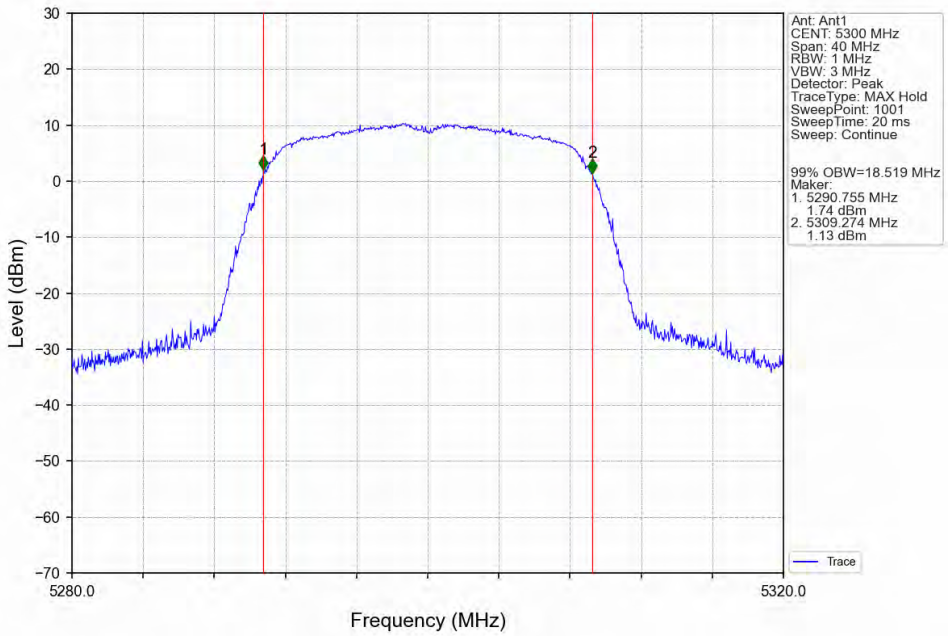
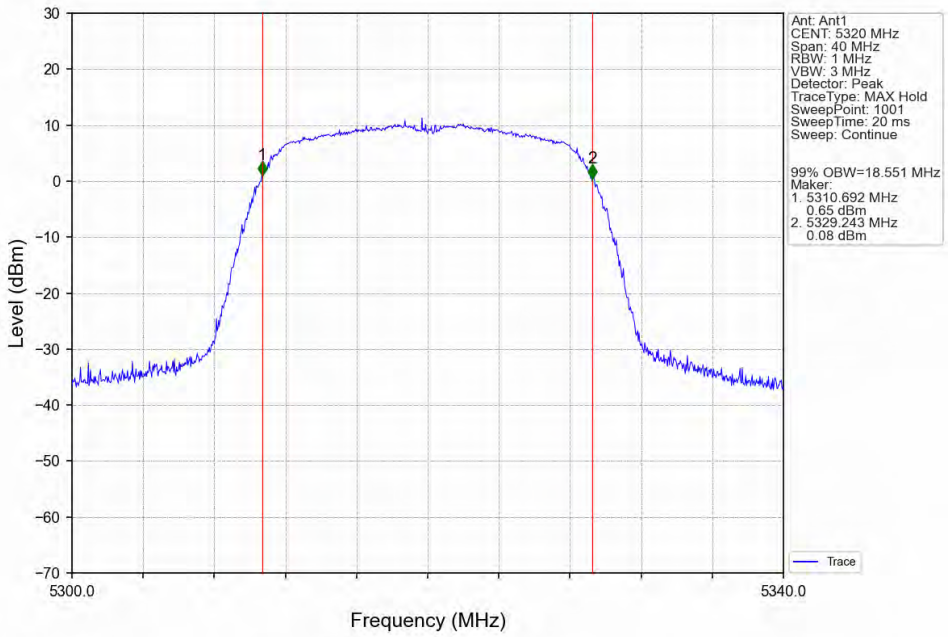
802.11n(HT20)_MCH_5300MHz_Ant1_NTNV



802.11n(HT20)_HCH_5320MHz_Ant1_NTNV



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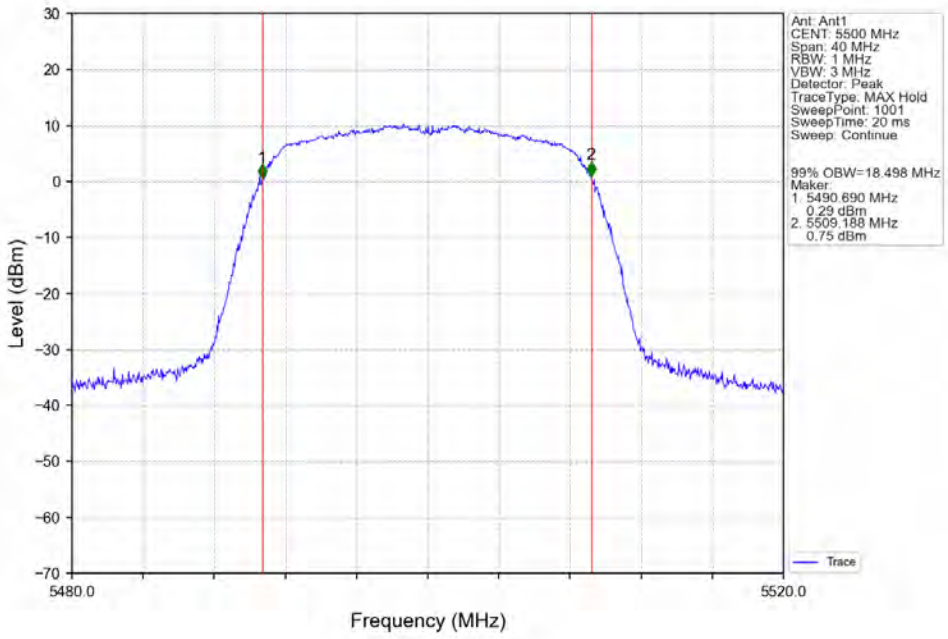
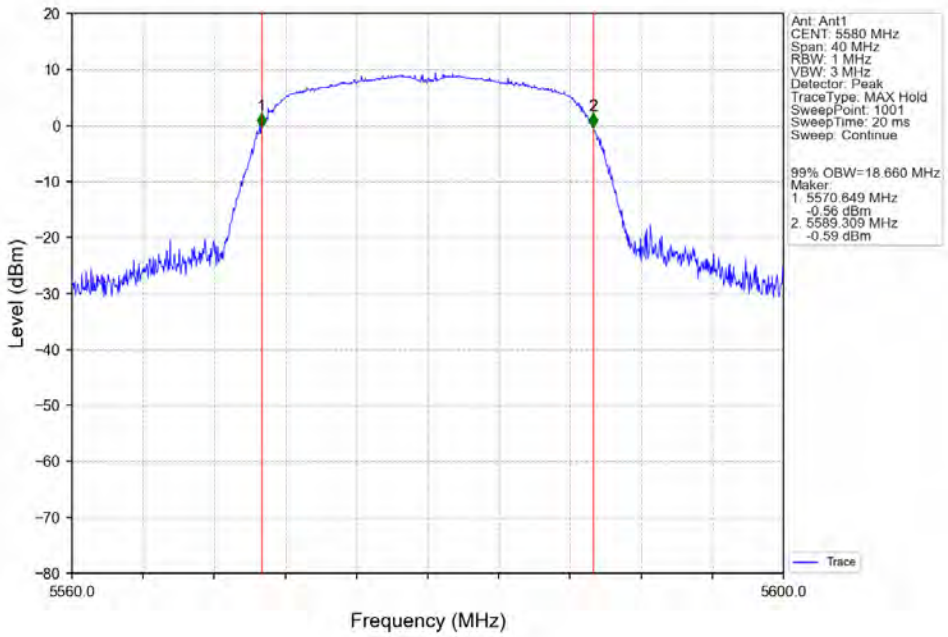
802.11n(HT20)_LCH_5500MHz_Ant1_NTNV



802.11n(HT20)_MCH_5580MHz_Ant1_NTNV



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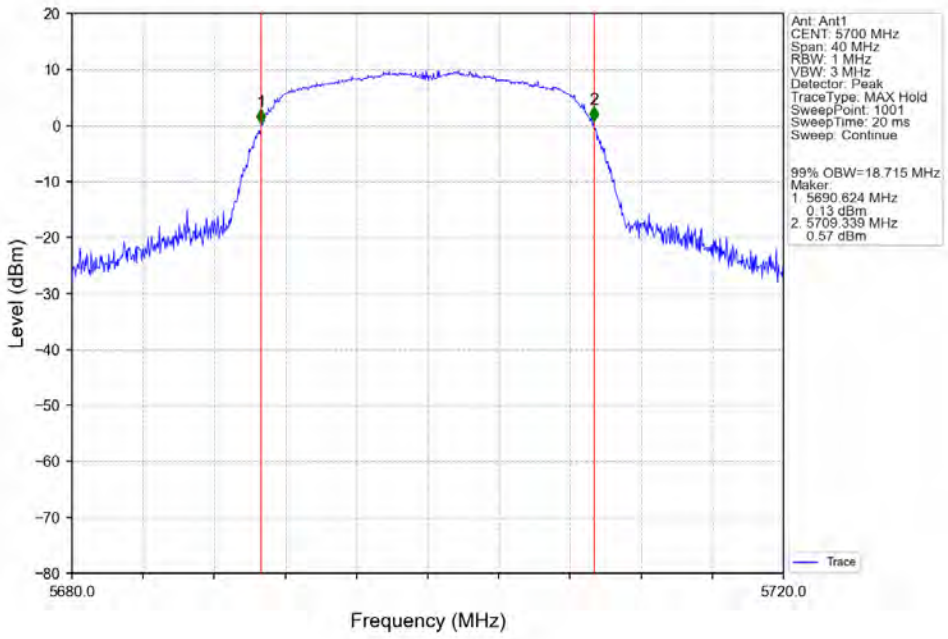
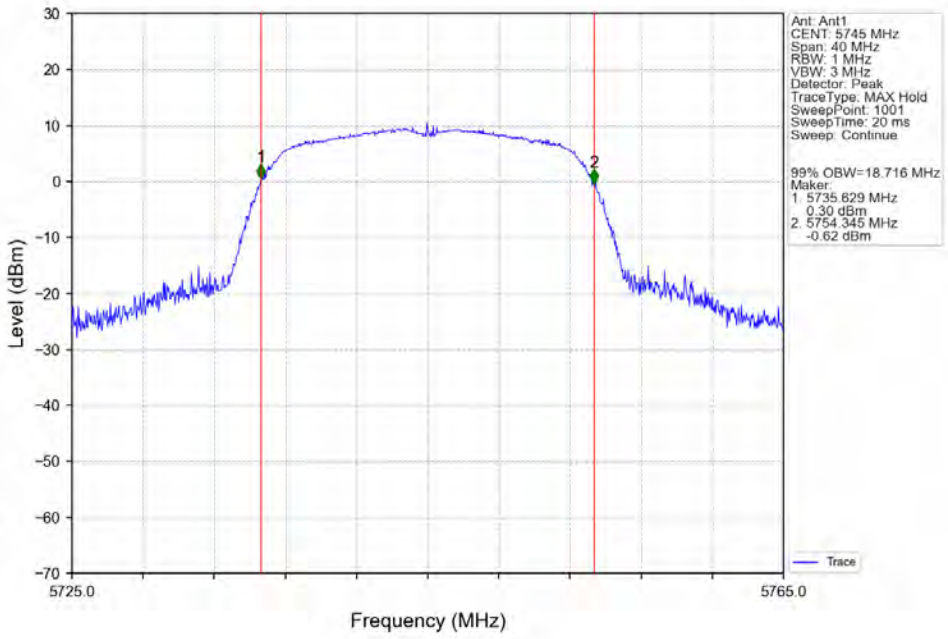
802.11n(HT20)_HCH_5700MHz_Ant1_NTNV



802.11n(HT20)_LCH_5745MHz_Ant1_NTNV



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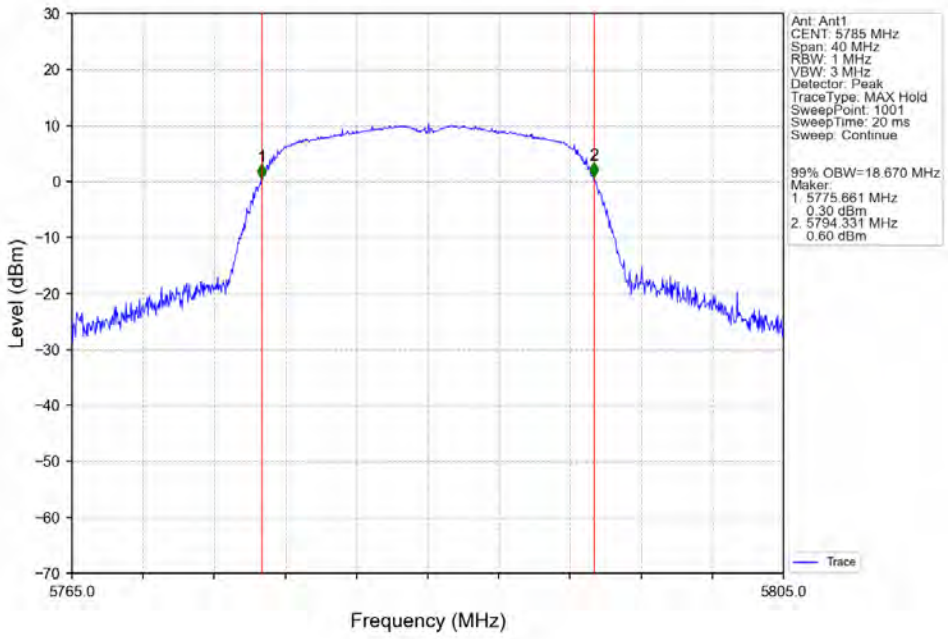
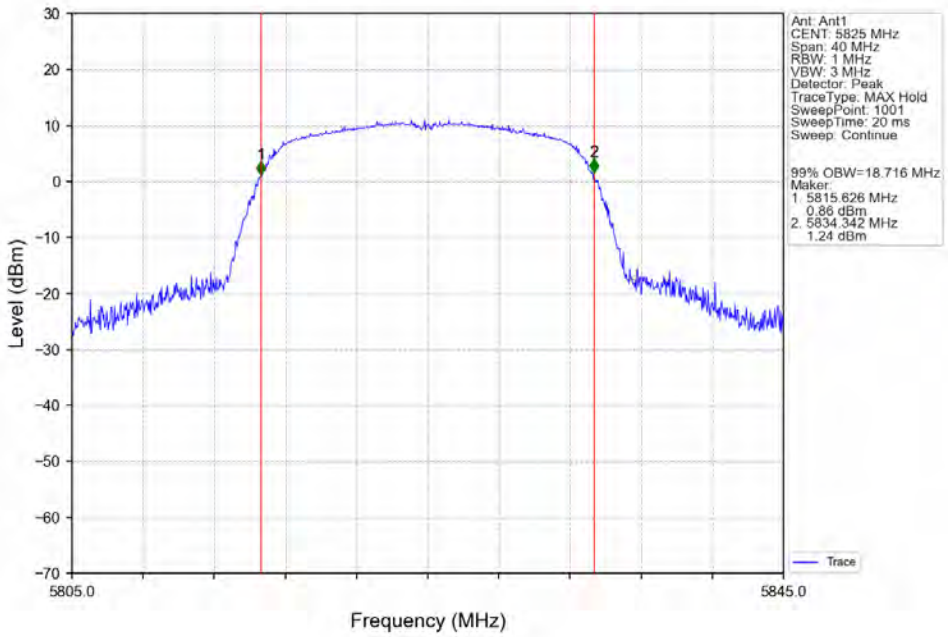
802.11n(HT20)_MCH_5785MHz_Ant1_NTNV



802.11n(HT20)_HCH_5825MHz_Ant1_NTNV



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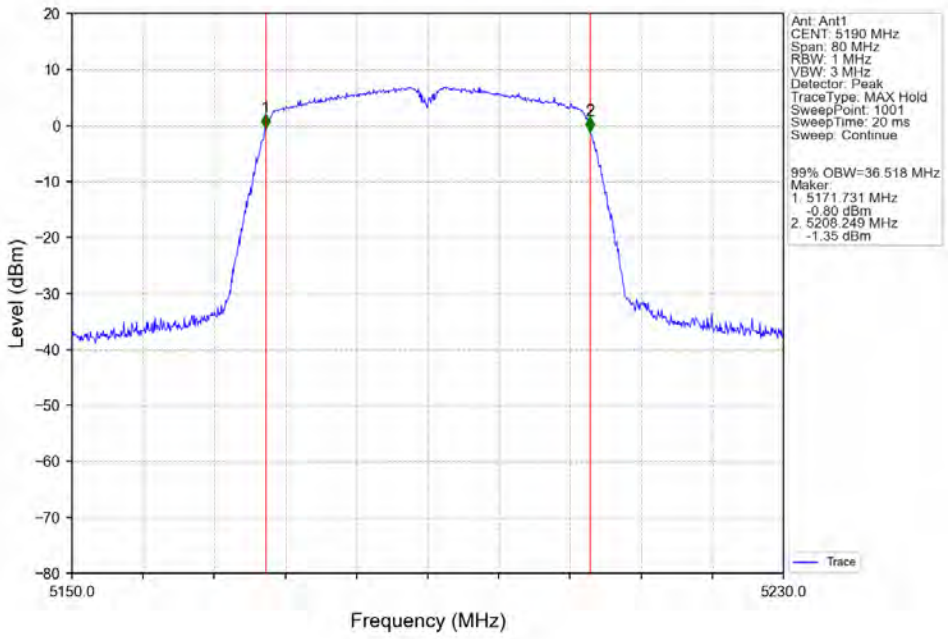
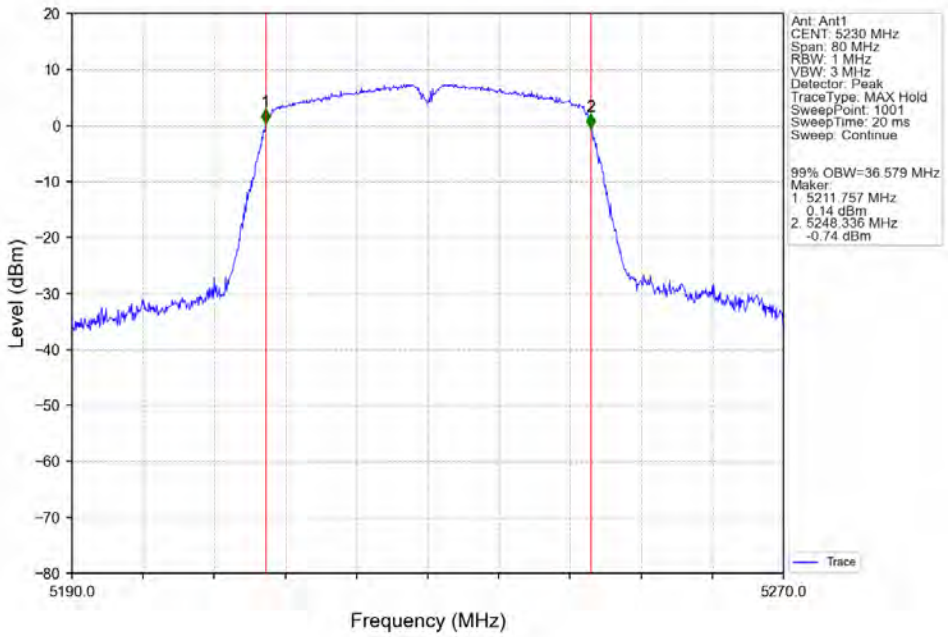
802.11n(HT40)_LCH_5190MHz_Ant1_NTNV



802.11n(HT40)_HCH_5230MHz_Ant1_NTNV



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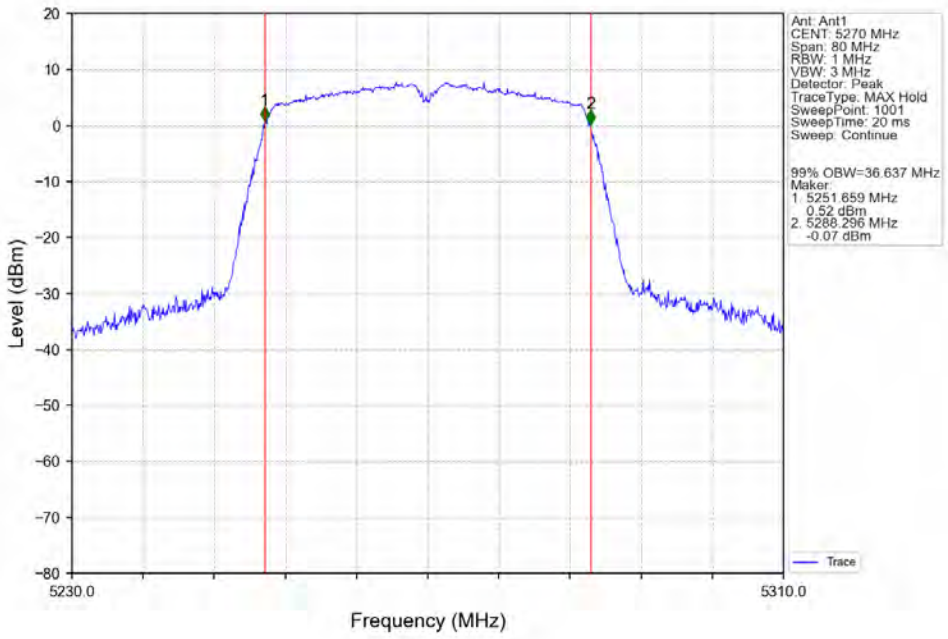
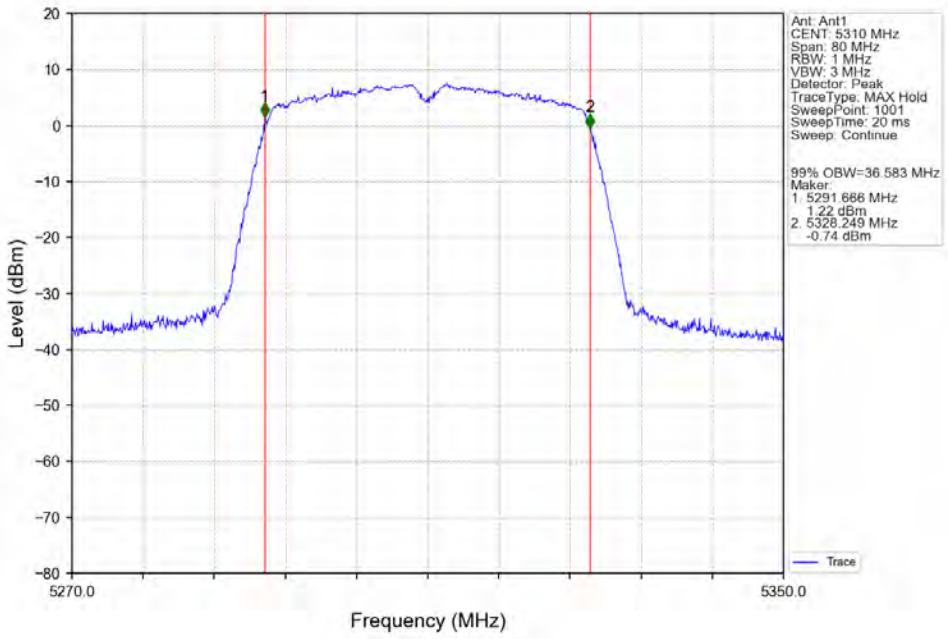
802.11n(HT40)_LCH_5270MHz_Ant1_NTNV



802.11n(HT40)_HCH_5310MHz_Ant1_NTNV



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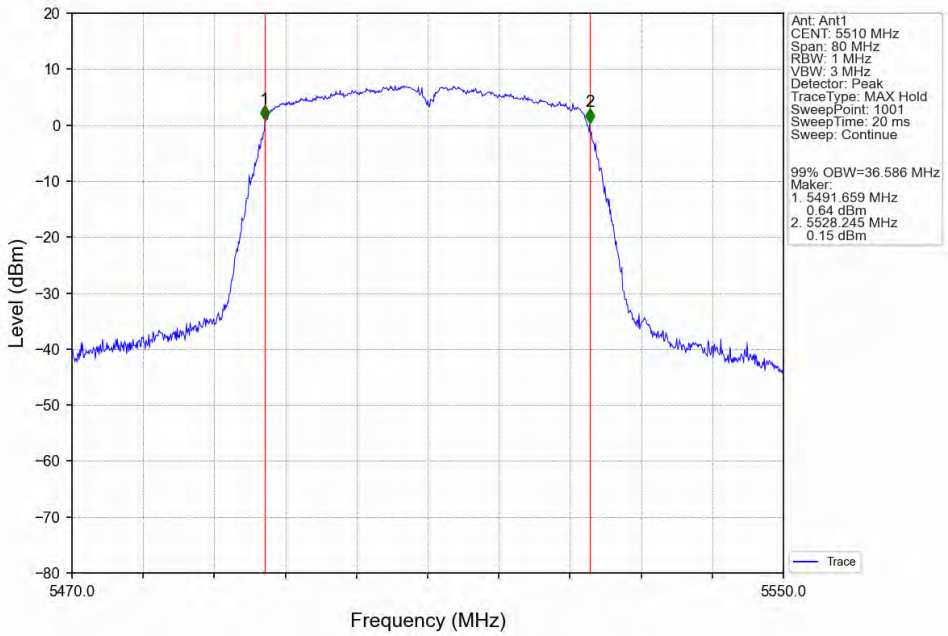
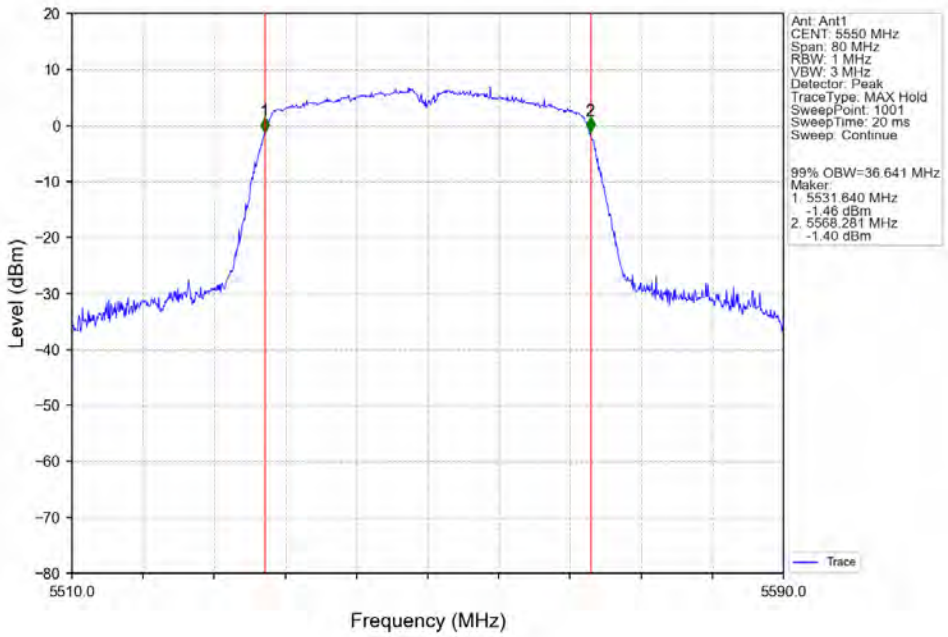
802.11n(HT40)_LCH_5510MHz_Ant1_NTNV



802.11n(HT40)_MCH_5550MHz_Ant1_NTNV



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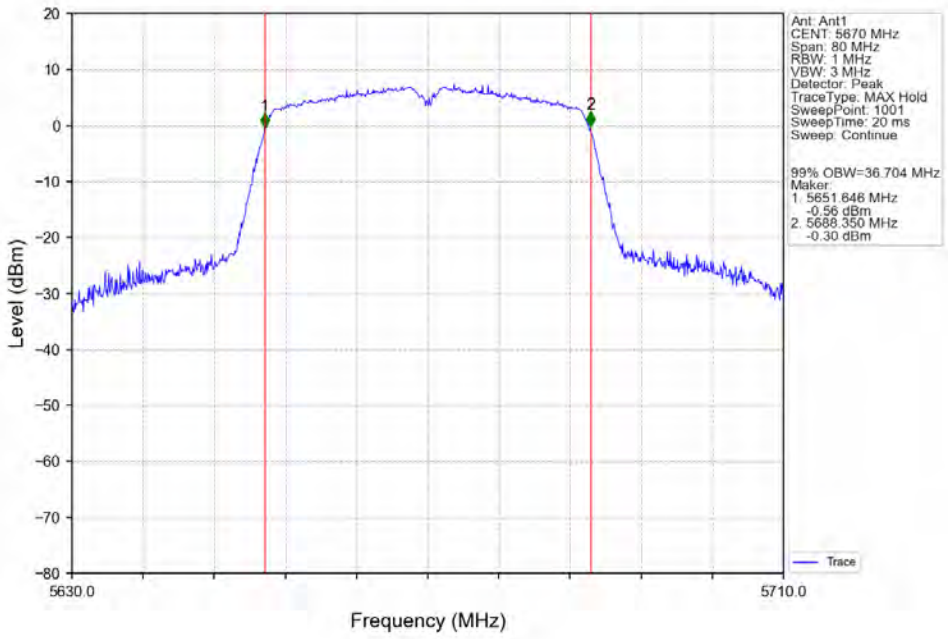
802.11n(HT40)_HCH_5670MHz_Ant1_NTNV



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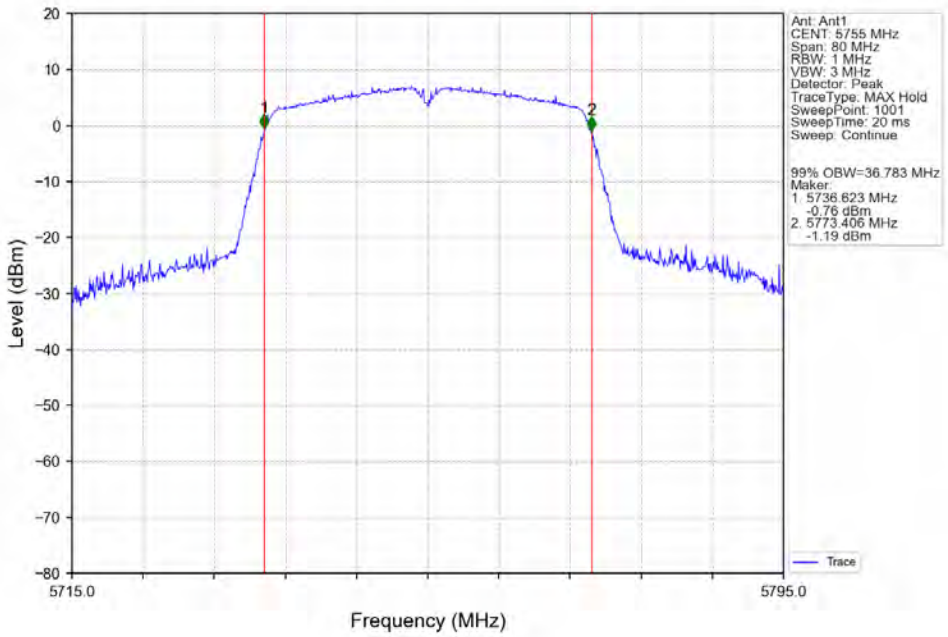

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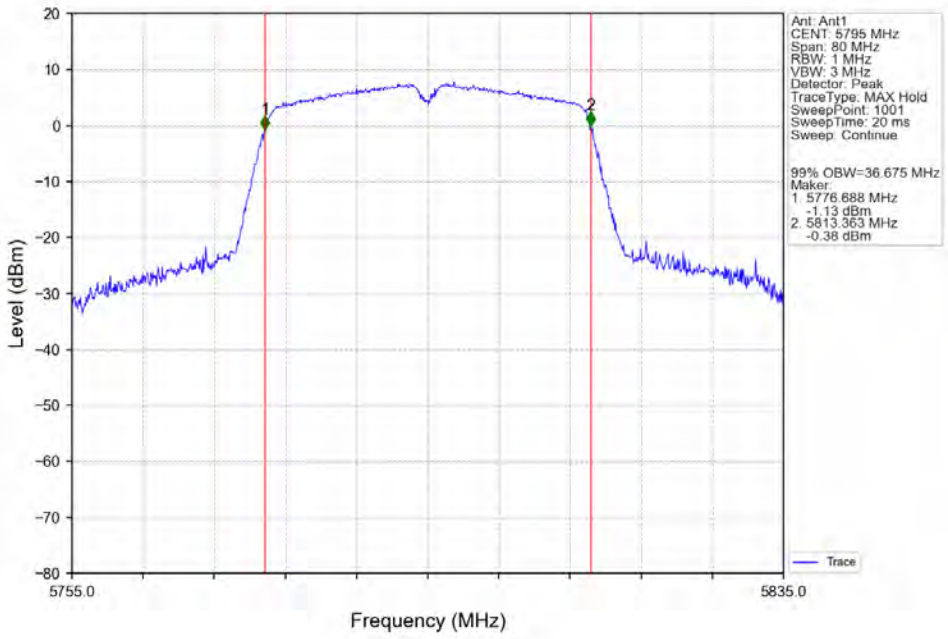
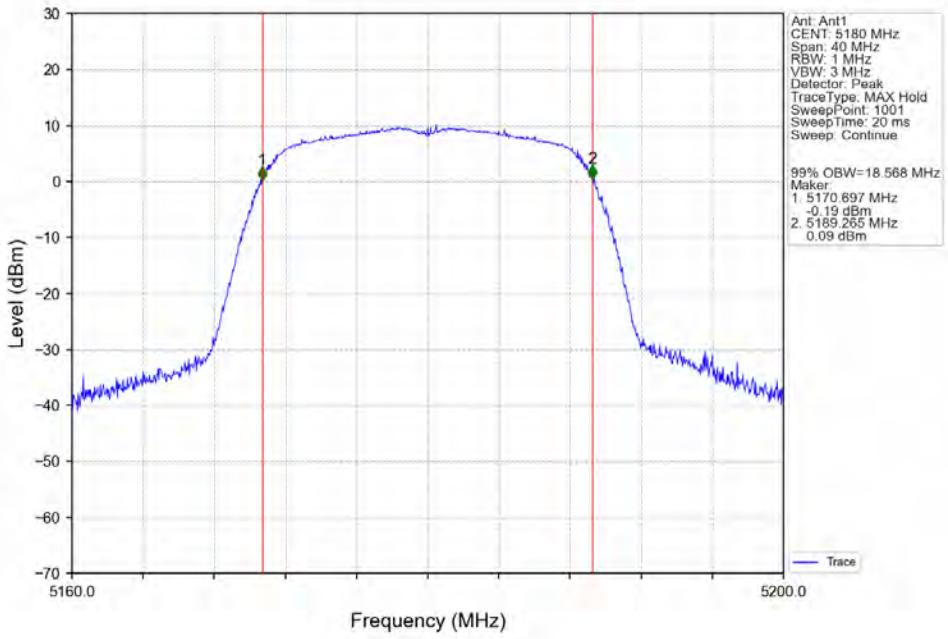
802.11n(HT40)_HCH_5795MHz_Ant1_NTNV



802.11ac(VHT20)_LCH_5180MHz_Ant1_NTNV



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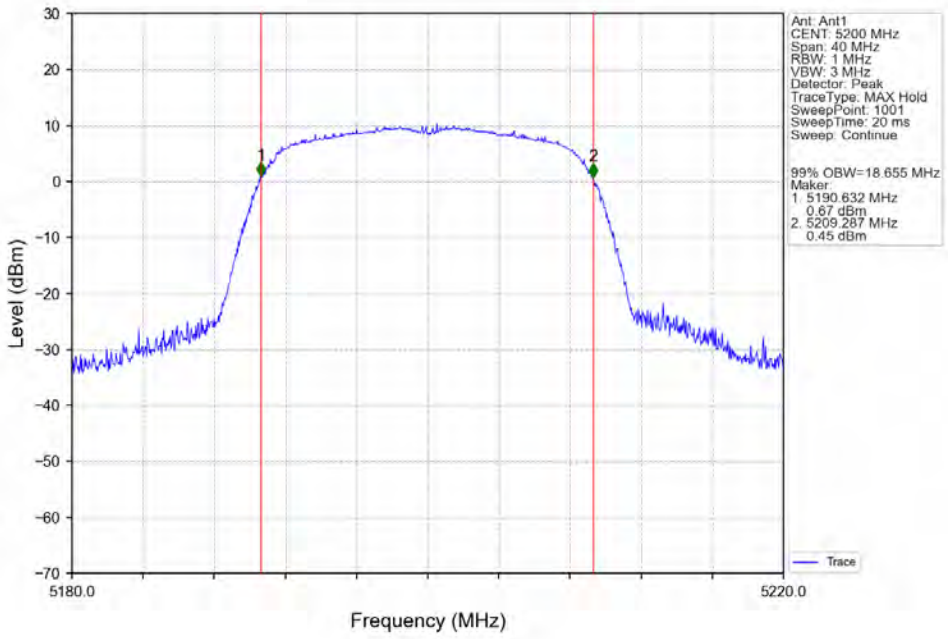
802.11ac(VHT20)_MCH_5200MHz_Ant1_NTNV



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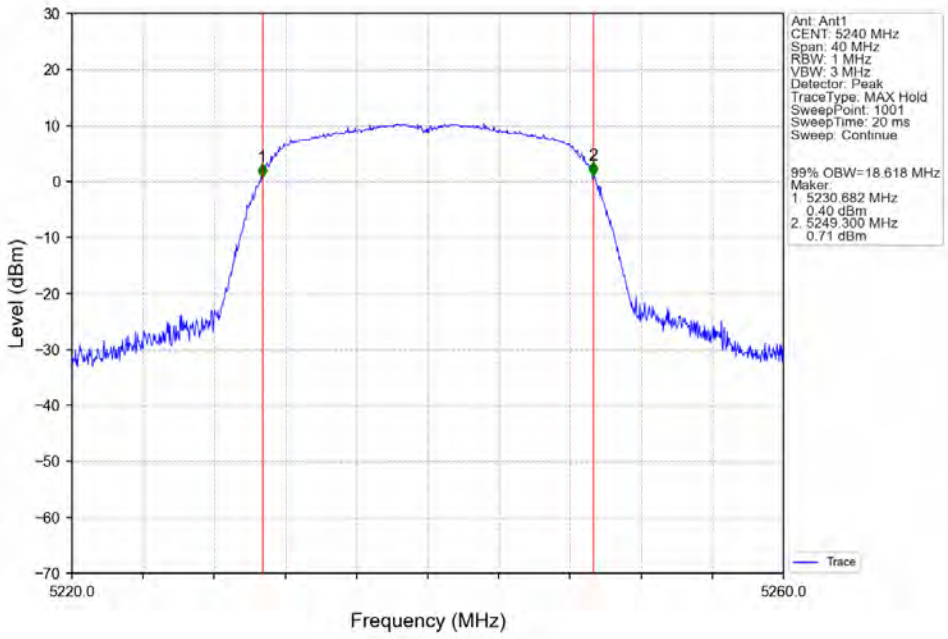

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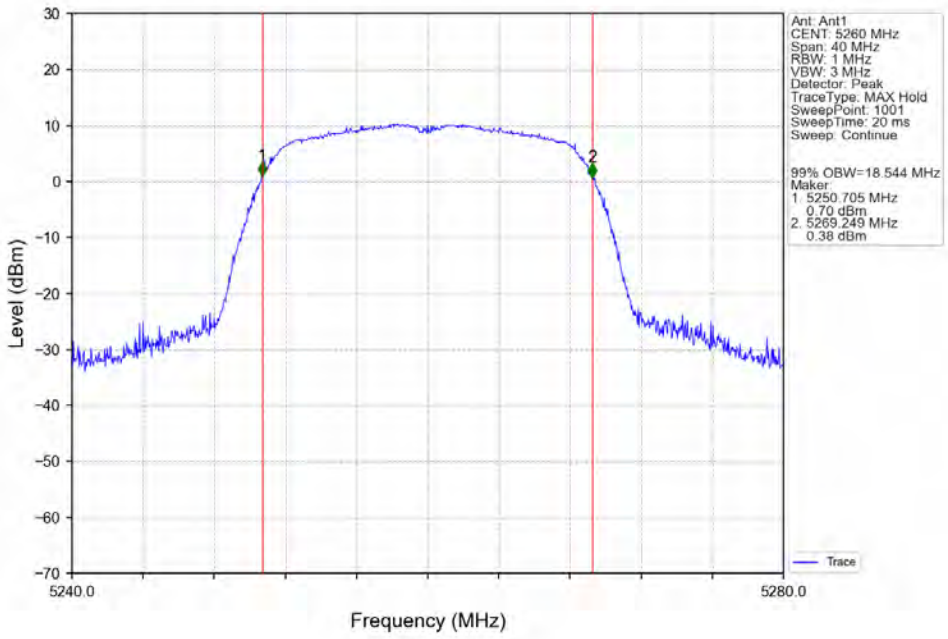
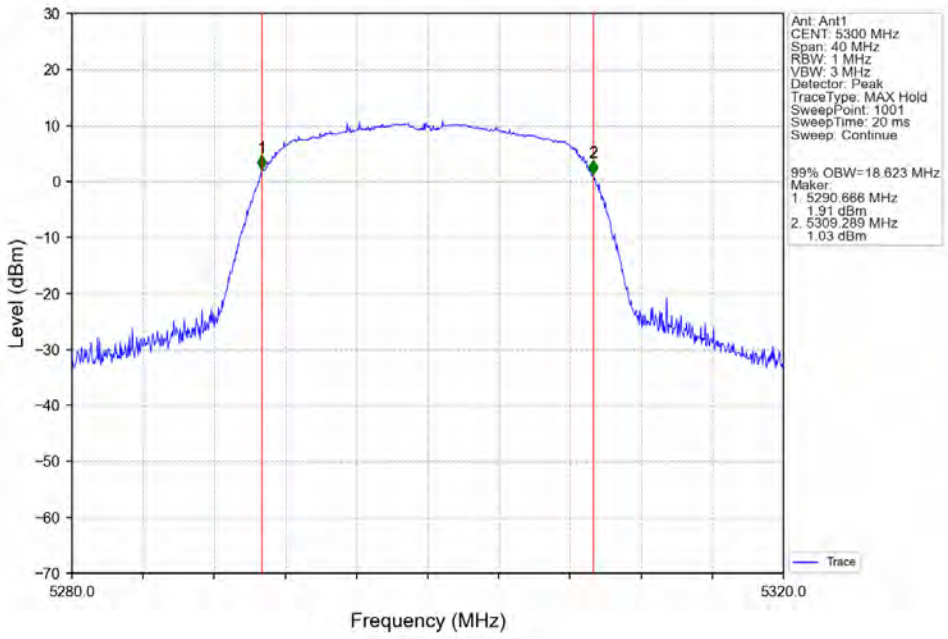
802.11ac(VHT20)_LCH_5260MHz_Ant1_NTNV



802.11ac(VHT20)_MCH_5300MHz_Ant1_NTNV



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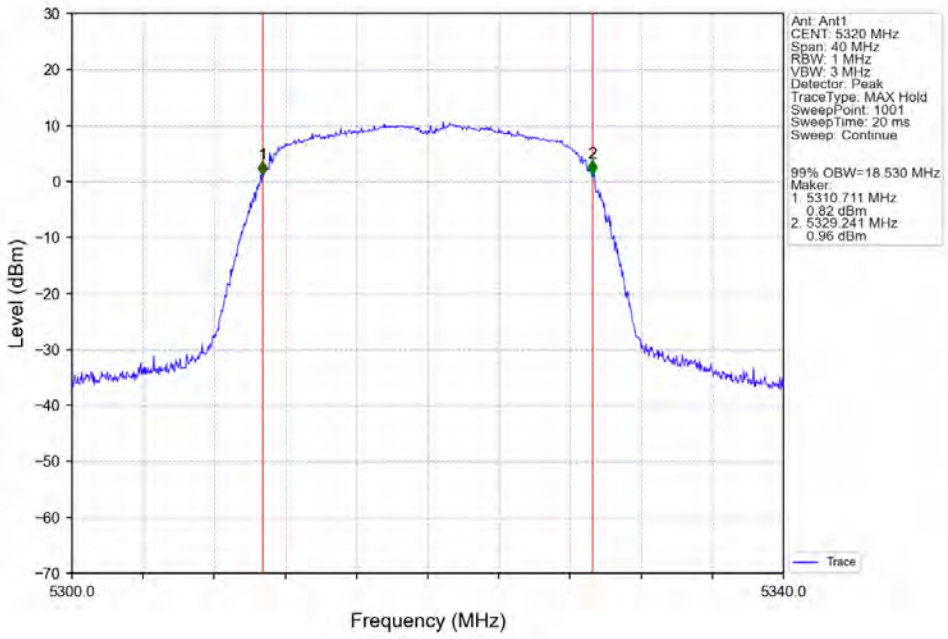
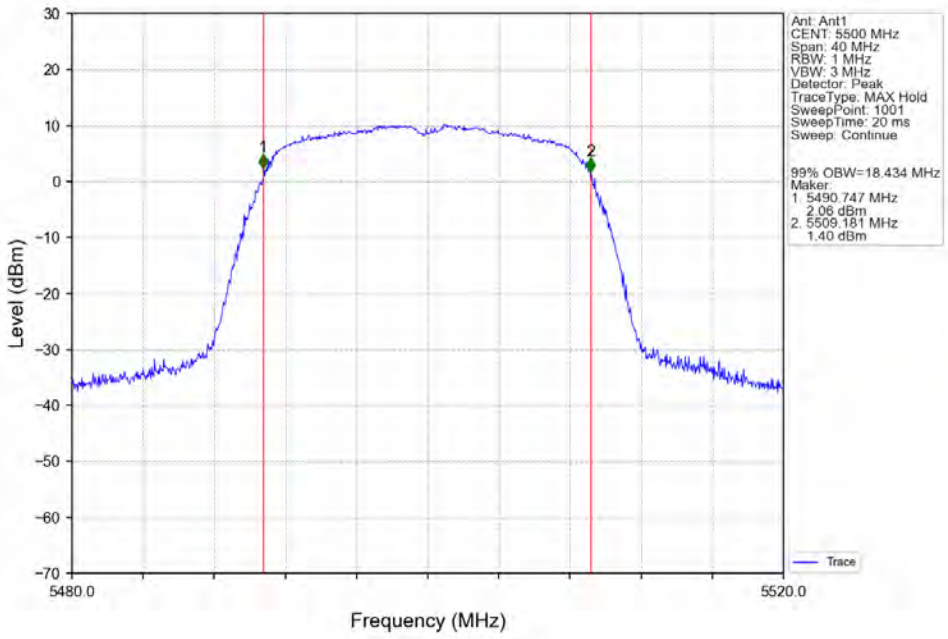
802.11ac(VHT20)_HCH_5320MHz_Ant1_NTNV



802.11ac(VHT20)_LCH_5500MHz_Ant1_NTNV



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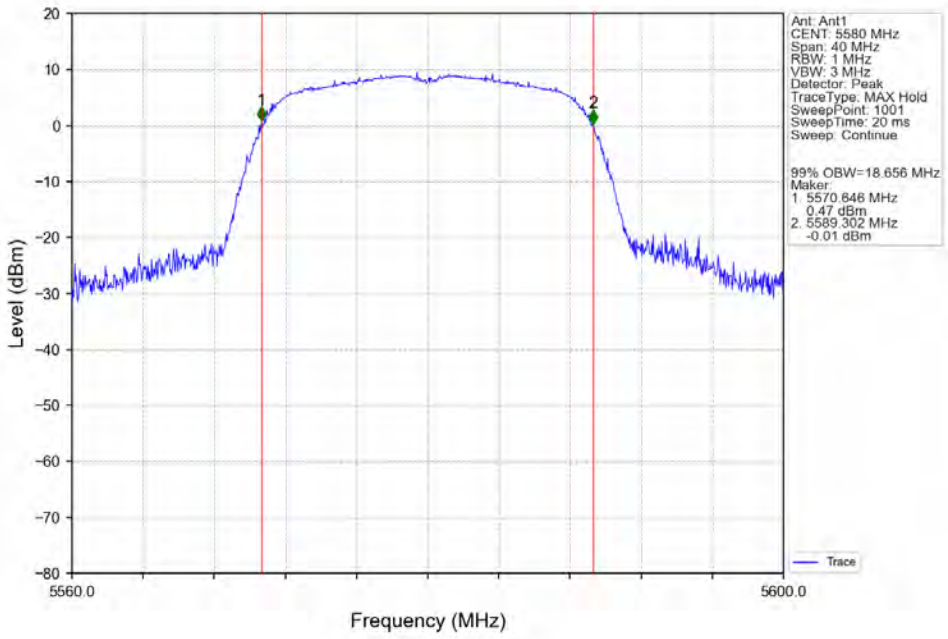
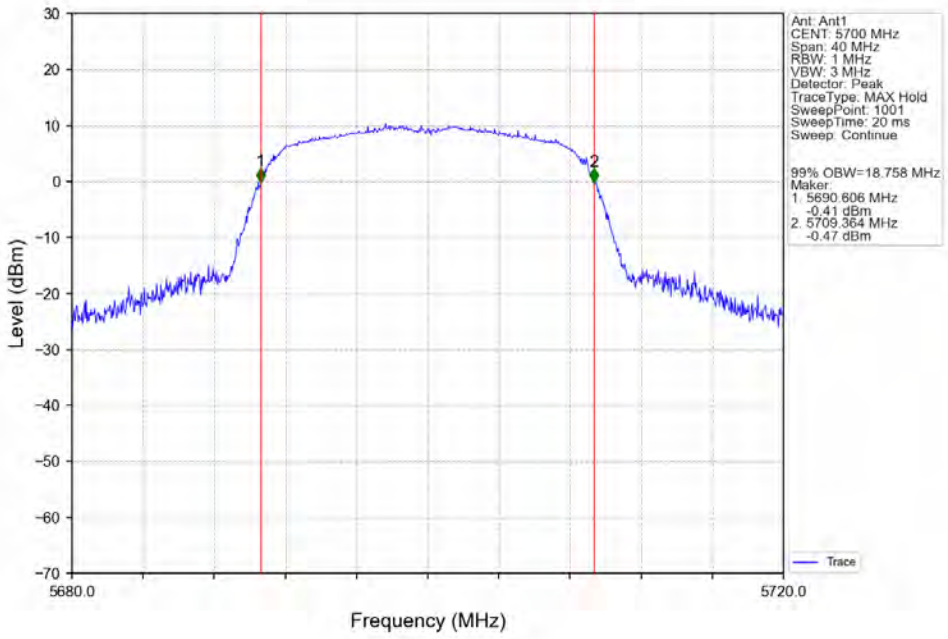
802.11ac(VHT20)_MCH_5580MHz_Ant1_NTNV



802.11ac(VHT20)_HCH_5700MHz_Ant1_NTNV



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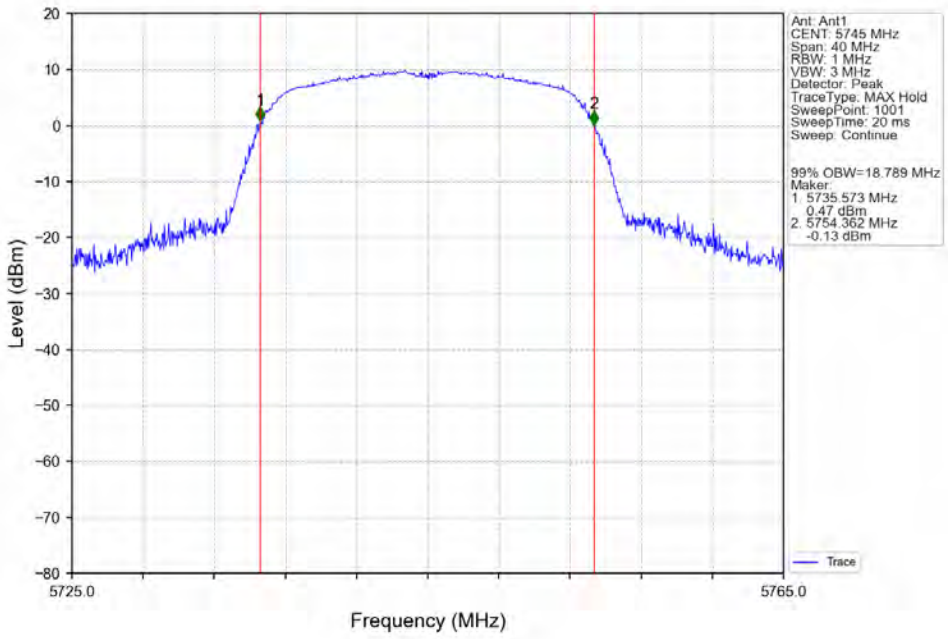
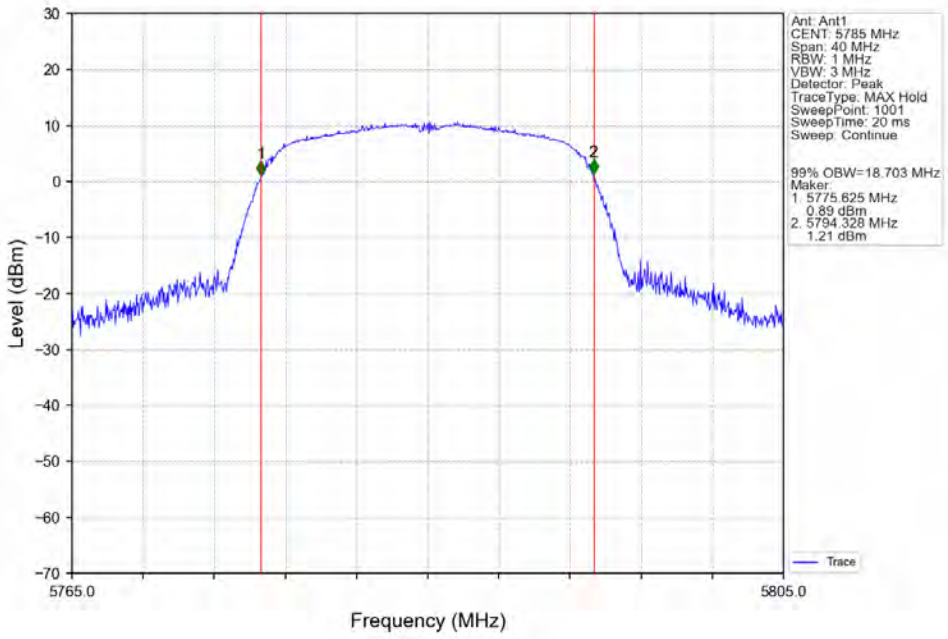
802.11ac(VHT20)_LCH_5745MHz_Ant1_NTNV



802.11ac(VHT20)_MCH_5785MHz_Ant1_NTNV



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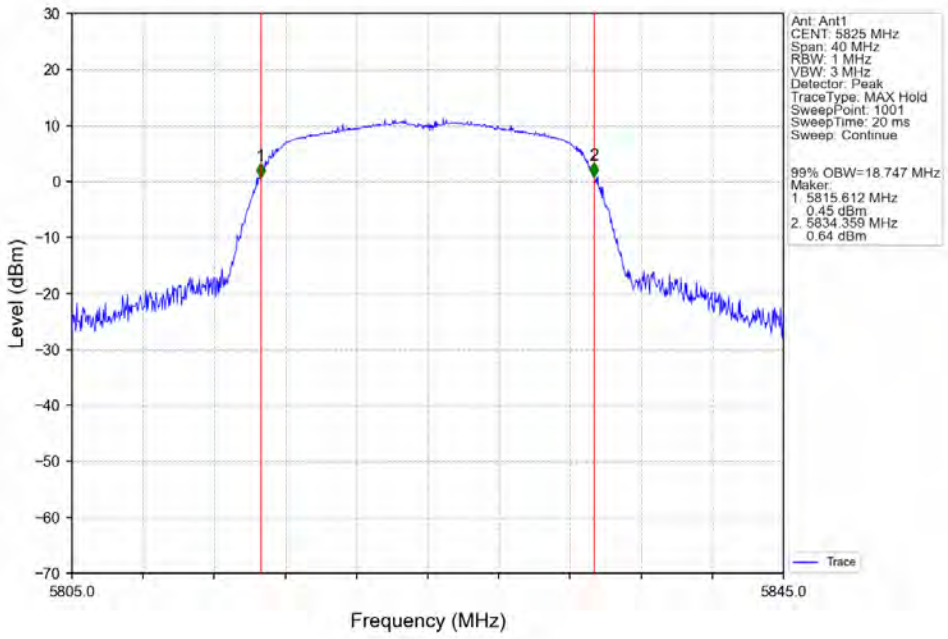
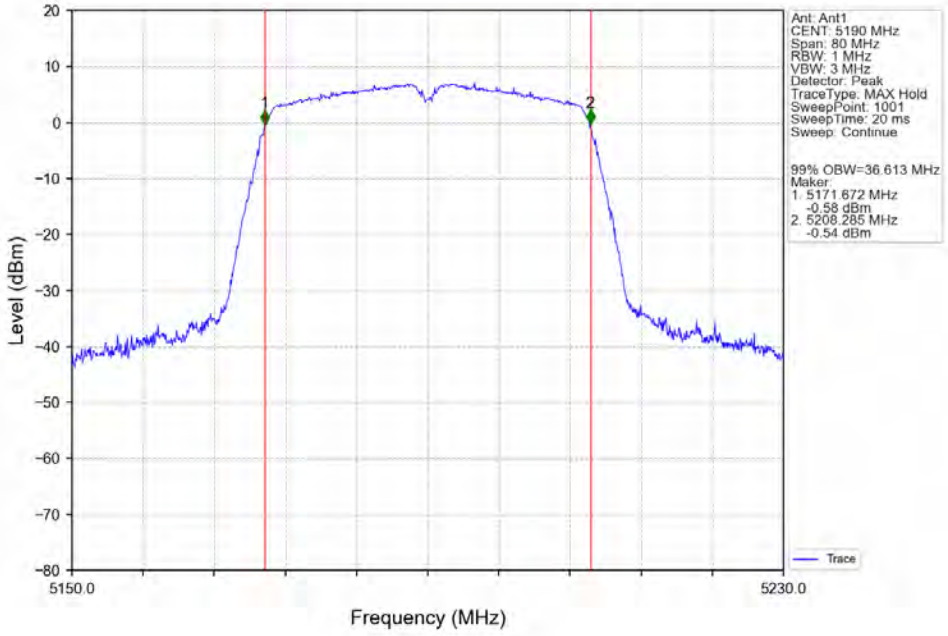
802.11ac(VHT20)_HCH_5825MHz_Ant1_NTNV



802.11ac(VHT40)_LCH_5190MHz_Ant1_NTNV



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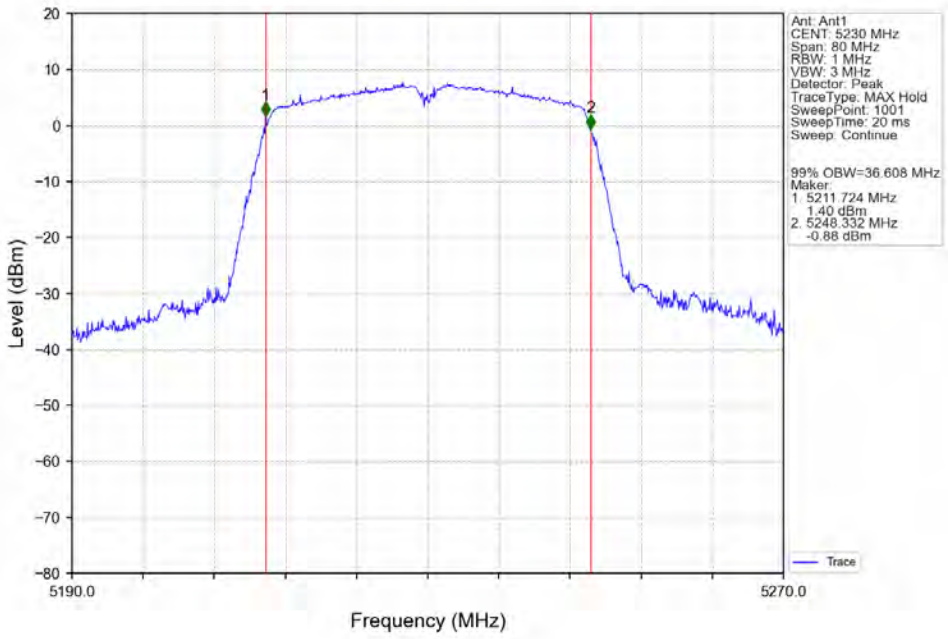
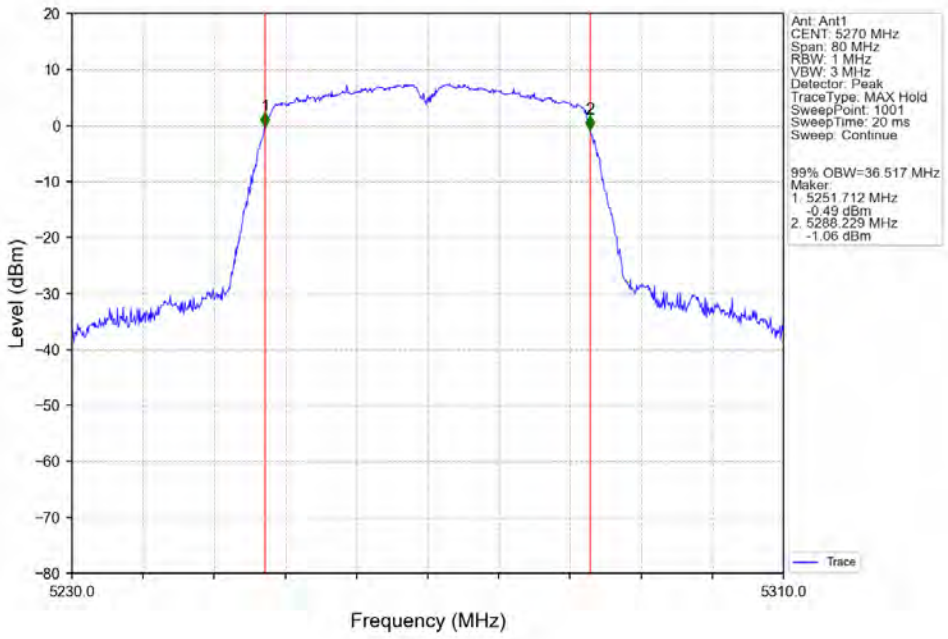
802.11ac(VHT40)_HCH_5230MHz_Ant1_NTNV



802.11ac(VHT40)_LCH_5270MHz_Ant1_NTNV



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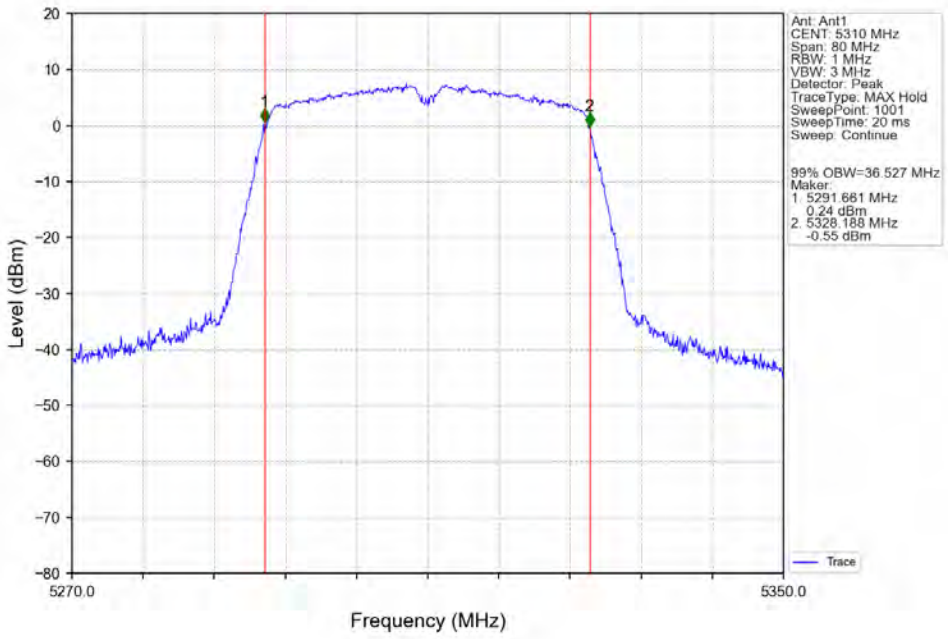
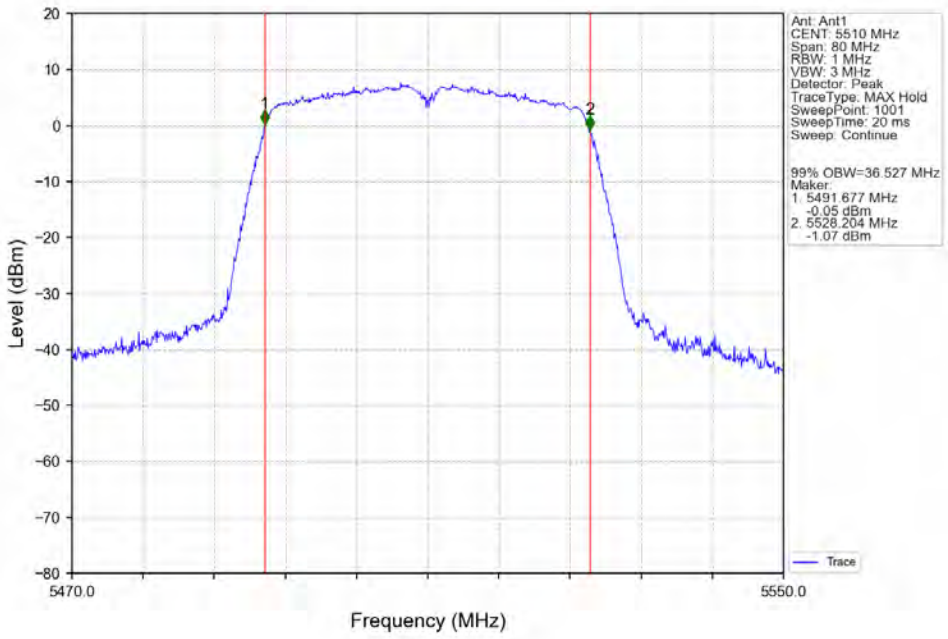
802.11ac(VHT40)_HCH_5310MHz_Ant1_NTNV



802.11ac(VHT40)_LCH_5510MHz_Ant1_NTNV



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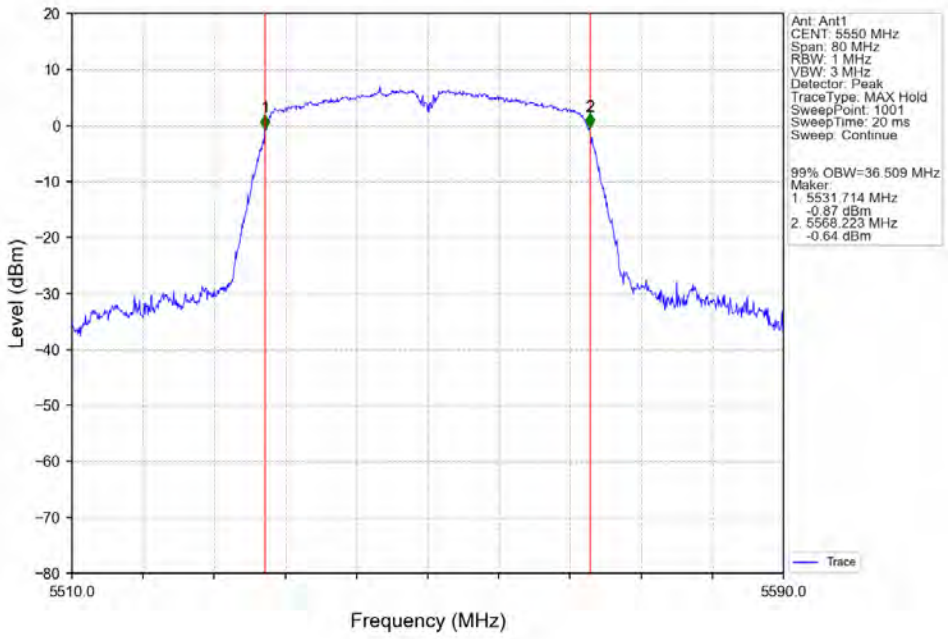
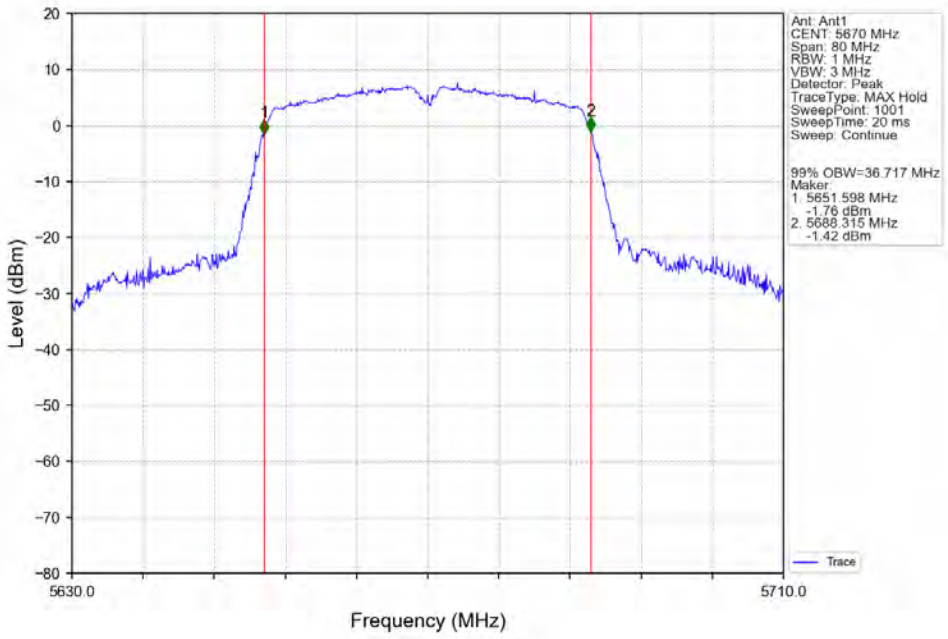
802.11ac(VHT40)_MCH_5550MHz_Ant1_NTNV



802.11ac(VHT40)_HCH_5670MHz_Ant1_NTNV



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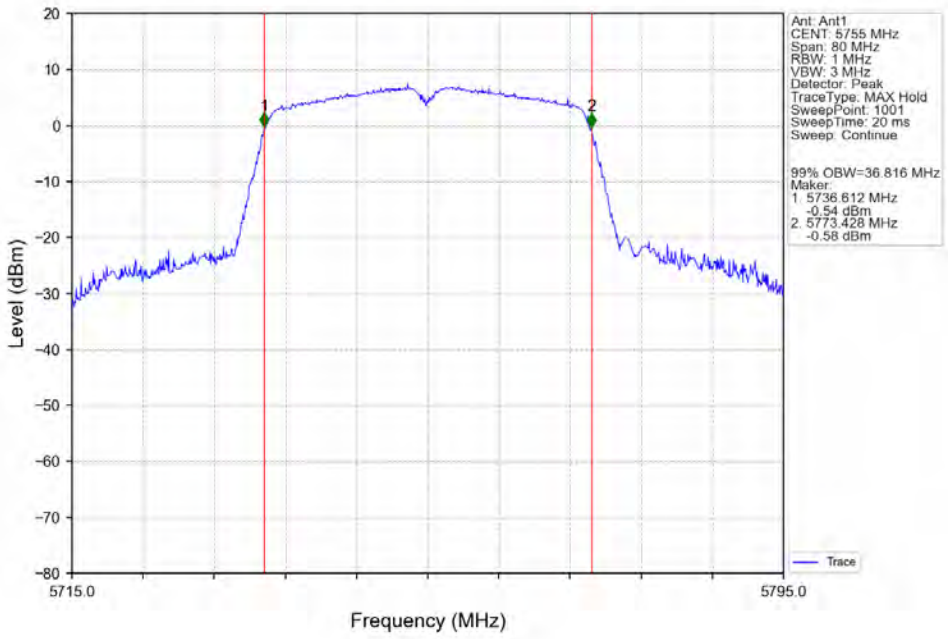
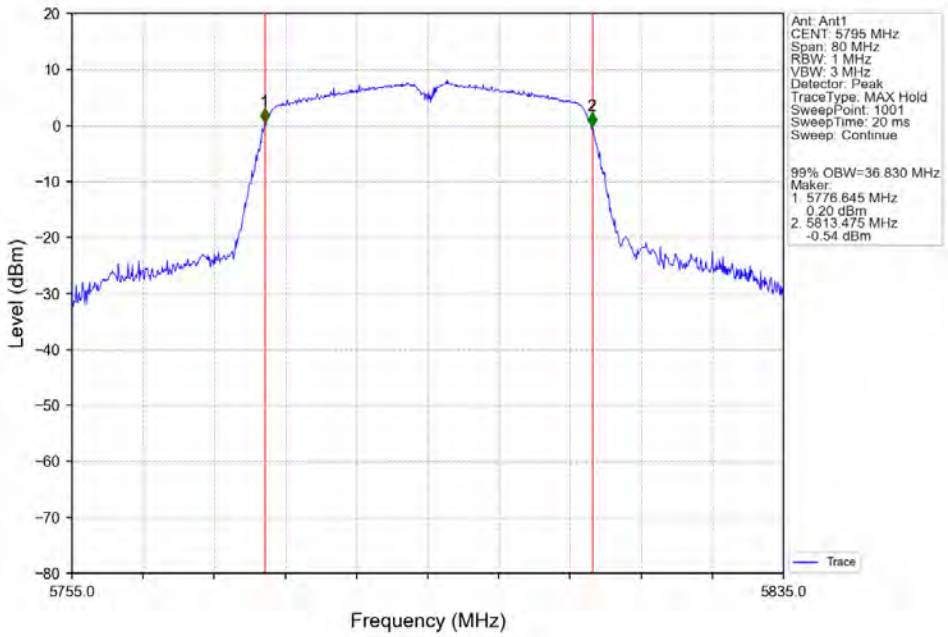
802.11ac(VHT40)_LCH_5755MHz_Ant1_NTNV



802.11ac(VHT40)_HCH_5795MHz_Ant1_NTNV



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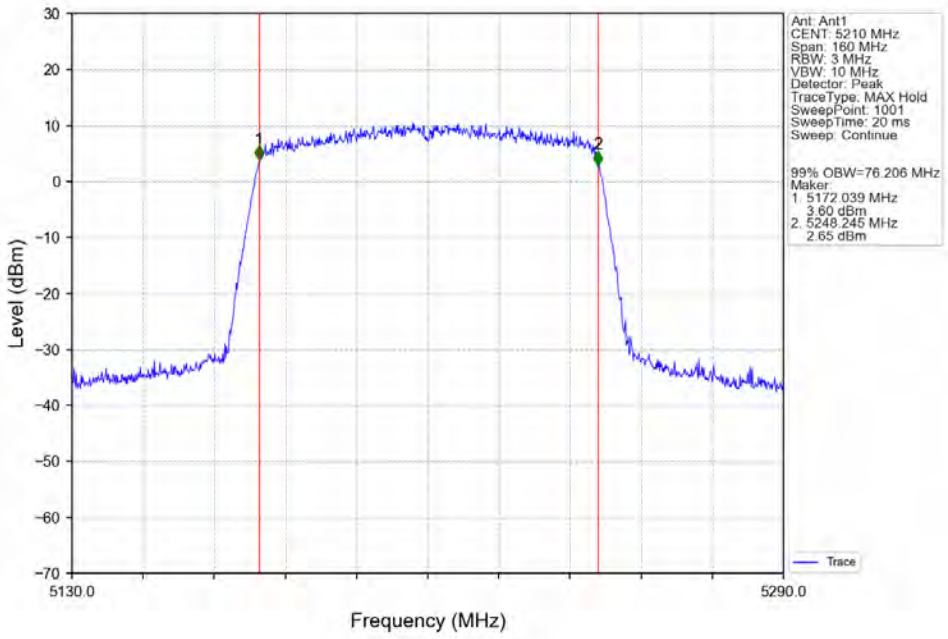
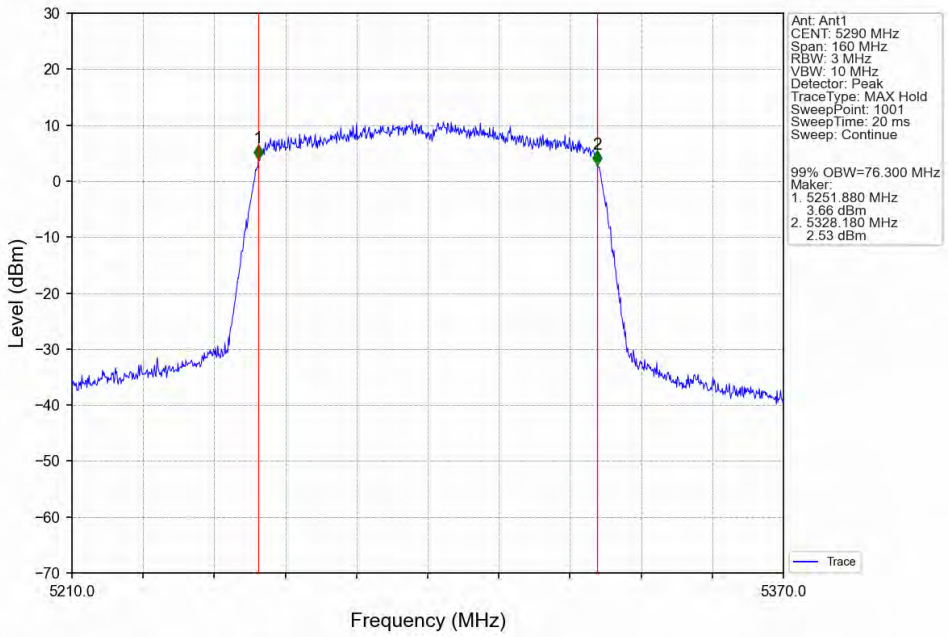
802.11ac(VHT80)_MCH_5210MHz_Ant1_NTNV



802.11ac(VHT80)_MCH_5290MHz_Ant1_NTNV



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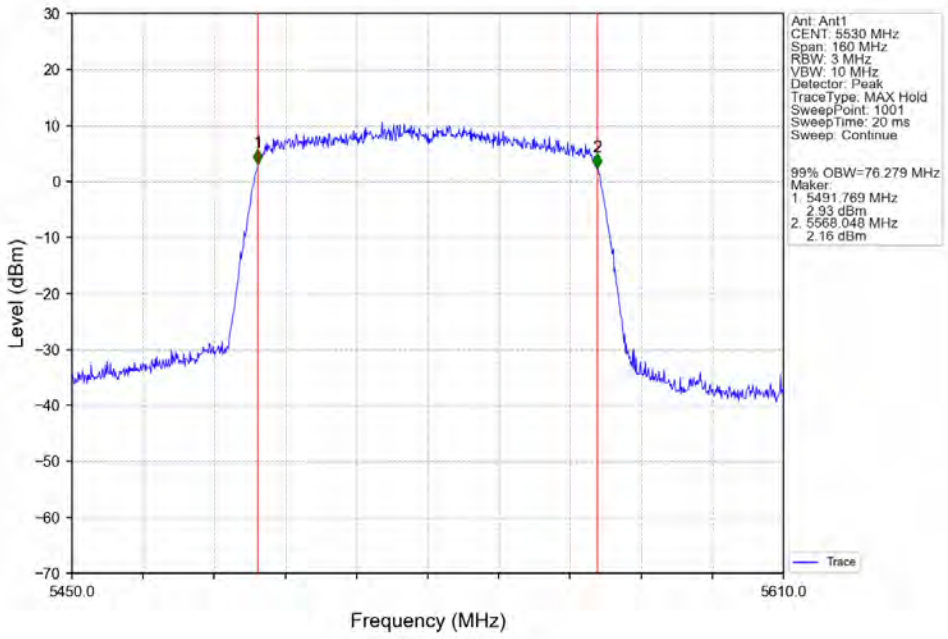
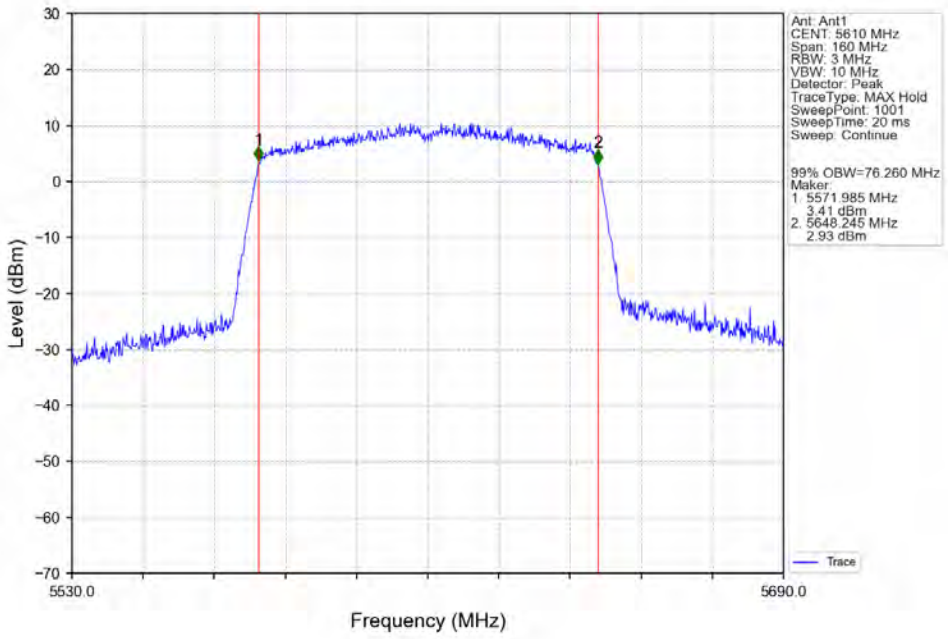
802.11ac(VHT80)_LCH_5530MHz_Ant1_NTNV



802.11ac(VHT80)_HCH_5610MHz_Ant1_NTNV



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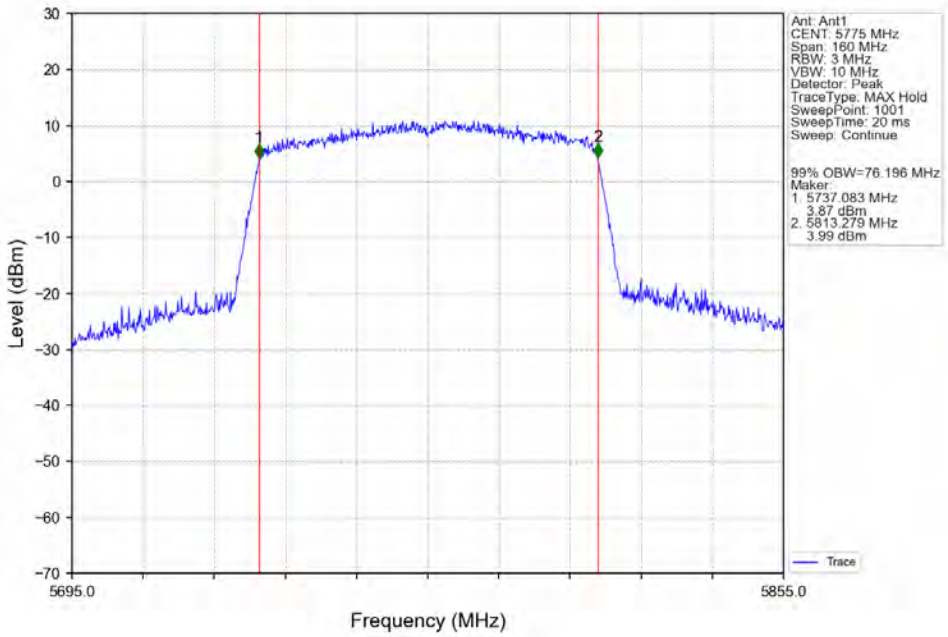
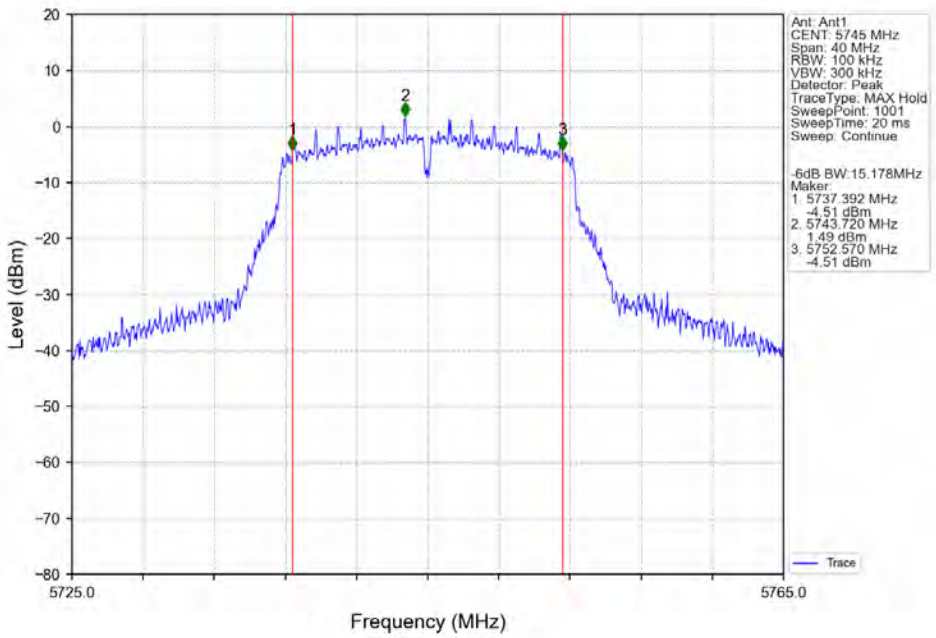
802.11ac(VHT80)_MCH_5775MHz_Ant1_NTNV

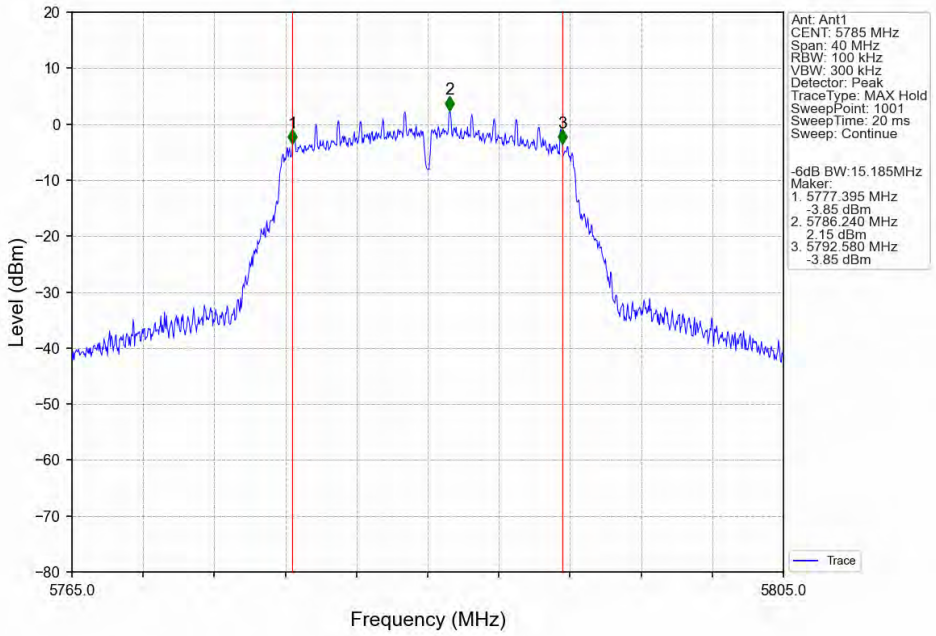


2.2.2 6dB BW

802.11a_LCH_5745MHz_Ant1_NTNV



802.11a_MCH_5785MHz_Ant1_NTNV



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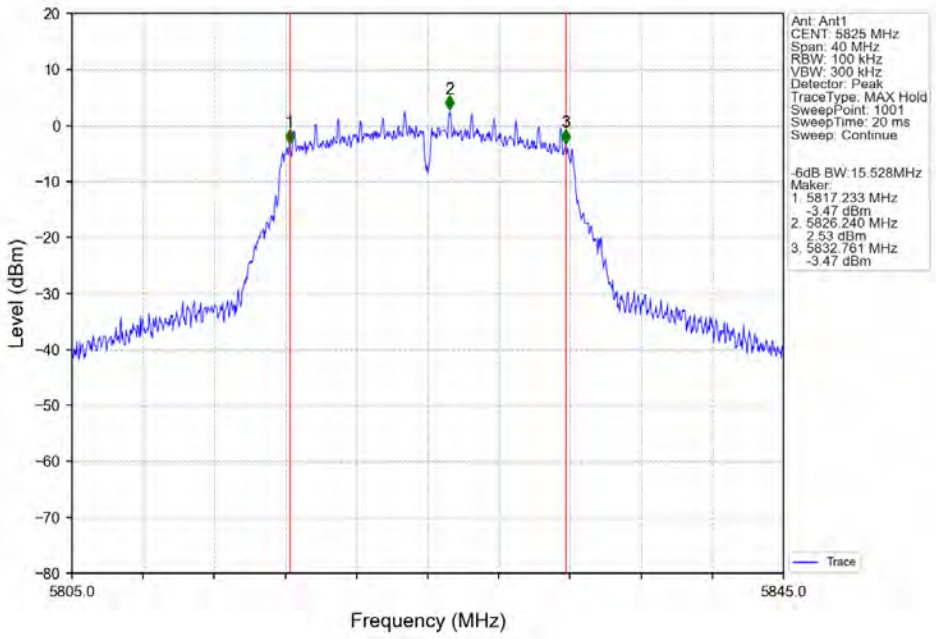
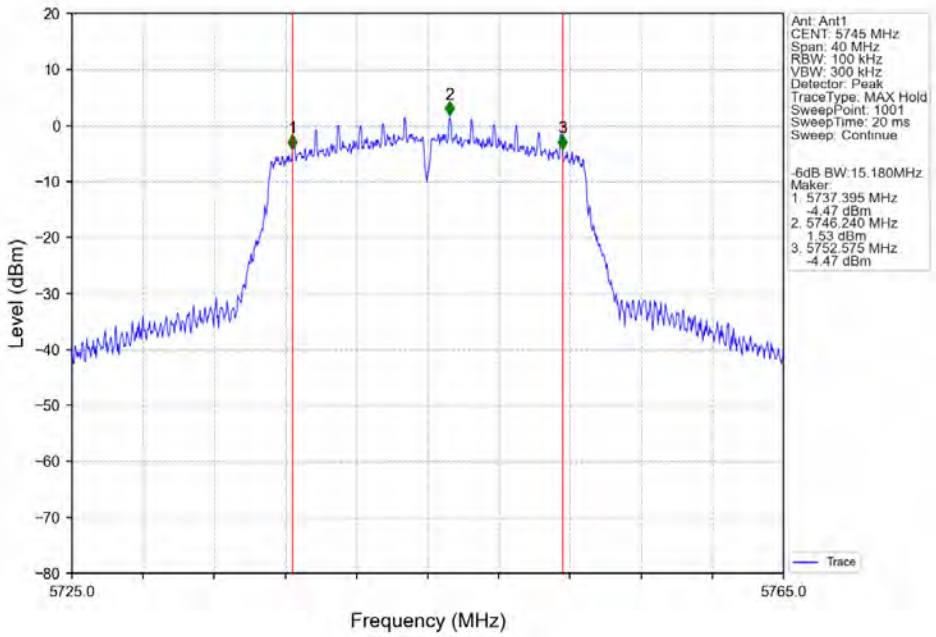
802.11a_HCH_5825MHz_Ant1_NTNV



802.11n(HT20)_LCH_5745MHz_Ant1_NTNV



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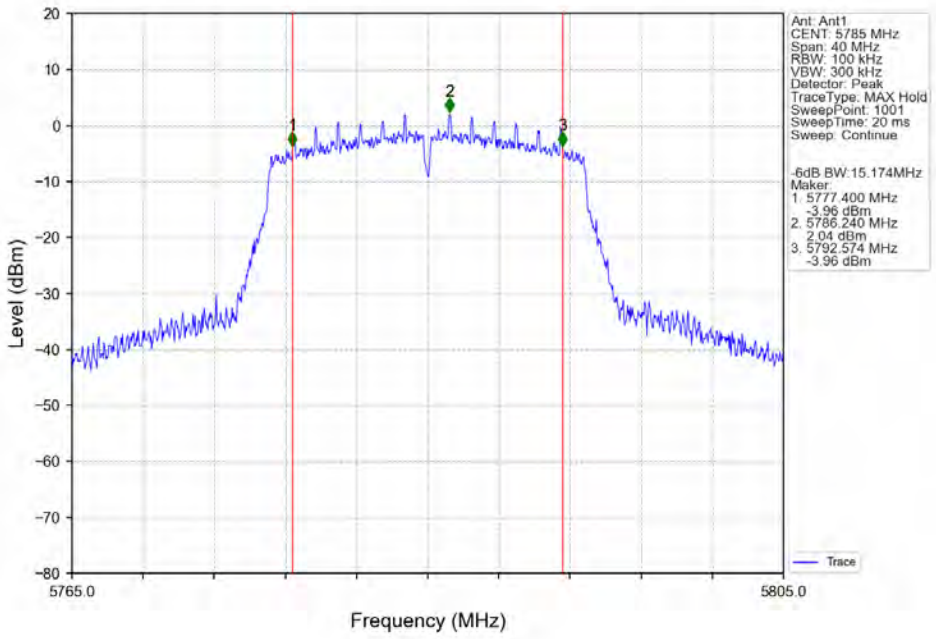
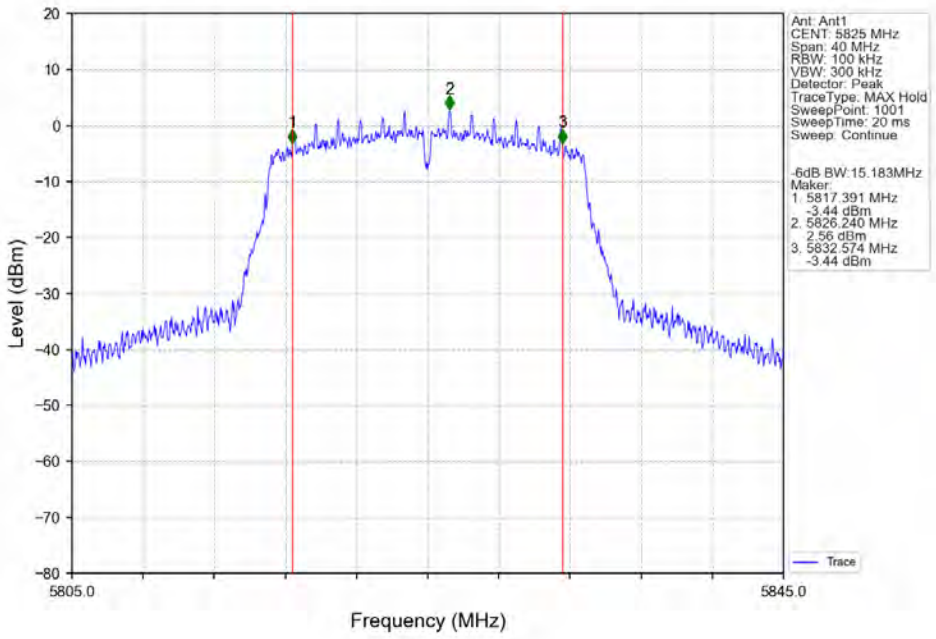
802.11n(HT20)_MCH_5785MHz_Ant1_NTNV



802.11n(HT20)_HCH_5825MHz_Ant1_NTNV



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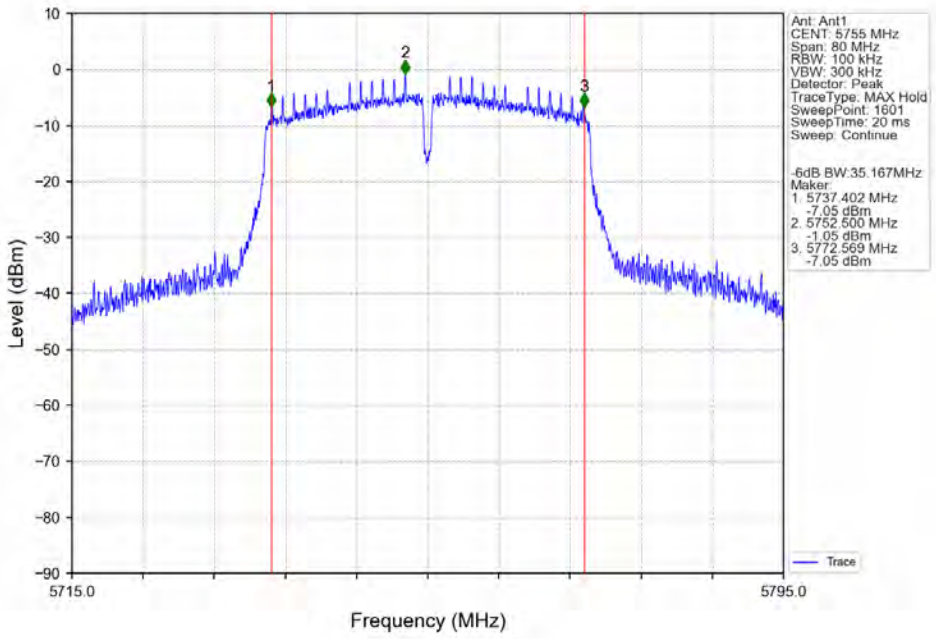
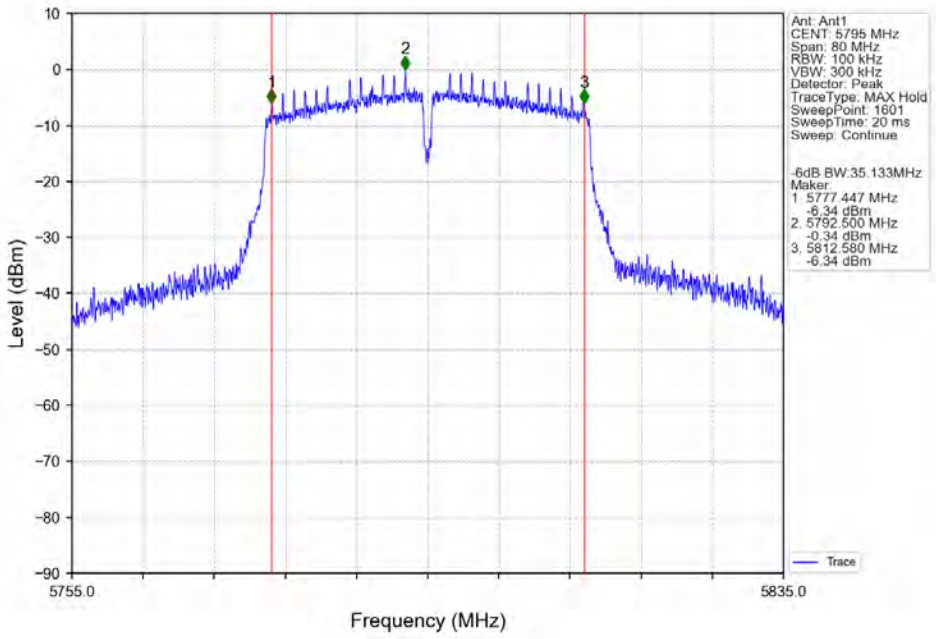
802.11n(HT40)_LCH_5755MHz_Ant1_NTNV



802.11n(HT40)_HCH_5795MHz_Ant1_NTNV



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