FCC RADIO TEST REPORT
FCC ID: 2ARKN-CRYSTAL

Product : VR All-in-one-Headset

Trade Mark : Pimax

Model Name : Crystal

Family Model : N/A

Report No. : S22102101906006

Issue Date: Jun. 07, 2023

Prepared for

Pimax Technology (Shanghai) Co., Ltd.

Building A, Building 1, 3000 Longdong Avenue, China (Shanghai) Pilot Free Trade Zone 406-C Shanghai P.R. China

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TEST RESULT CERTIFICATION

Applicant's name ..... Pimax Technology (Shanghai) Co., Ltd.

Address ..... Building A, Building 1, 3000 Longdong Avenue, China (Shanghai) Pilot Free Trade Zone 406-C Shanghai P.R. China

Manufacturer's Name ..... Pimax Technology (Shanghai) Co., Ltd.

Address ..... Building A, Building 1, 3000 Longdong Avenue, China (Shanghai) Pilot Free Trade Zone 406-C Shanghai P.R. China

Factory's Name..... Pimax Technology (Rizhao) Co., Ltd.

Address..... 3/F, South Zone, A6 workshop, Electronic Industrial Park , Gaoxin 7th Road, Rizhao High-tech Zone, Shandong Province, China

Product description

Product name..... VR All-in-one-Headset

Trade Mark ..... Pimax

Model and/or type reference ..... Crystal

Family Model..... N/A

Test Sample Number S221021019012

Standards ..... FCC Part 15 Subpart E

Test procedure..... ANSI C63.10-2013;
KDB 789033 D02 General UNII Test Procedures New Rules v02r01
KDB 662911 D01 Multiple Transmitter Output v02r01
KDB 987594 D02 U-NII 6GHz EMC Measurement v01r01

This device described above has been tested by NTEK, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements/ the Industry Canada requirements.. And it is applicable only to the tested sample identified in the report.

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Date of Test.....

Date (s) of performance of tests..... Feb. 08, 2023 ~ Jun. 07, 2023

Date of Issue..... Jun. 07, 2023

Test Result..... **Pass**

Testing Engineer : Mukzi Lee

(Mukzi Lee)

Authorized Signatory : Alex

(Alex Li)

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Revision History

Report No.	Version	Description	Issued Date
S22102101906006	Rev.01	Initial issue of report	Jun. 07, 2023

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.407) , Subpart E			
Standard Section	Test Item	Judgment	Remark
15.407(b)(9)	AC Power Line Conducted Emissions	PASS	
15.407(b)(6)	Radiated Emissions	PASS	
15.407(b)(7)	In-Band Emissions	PASS	
2.1049	99% Occupied Bandwidth	PASS	
15.407(a)(10)	26 dB Emission Bandwidth	PASS	
15.407(a)(8)	Maximum E.I.R.P Output Power	PASS	
15.407(a)(8)	E.I.R.Power Spectral Density	PASS	
15.407(d)(6)	Contention Based Protocol	PASS	
15.407(g)	Frequency Stability	PASS	
15.203	Antenna Requirement	PASS	

1.1 FACILITIES AND ACCREDITATIONS

FACILITIES

All measurement facilities used to collect the measurement data are located at

1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen 518126 P.R. China.

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

CNAS-Lab.	:	The Certificate Registration Number is L5516.
IC-Registration		The Certificate Registration Number is 9270A. CAB identifier:CN0074
FCC- Accredited		Test Firm Registration Number: 463705. Designation Number: CN1184
A2LA-Lab.		The Certificate Registration Number is 4298.01
Name of Firm	:	Shenzhen NTEK Testing Technology Co., Ltd.
Site Location	:	1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen 518126 P.R.China.

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y±U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	±2.80dB
2	RF power, conducted	±0.16dB
3	Spurious emissions, conducted	±0.21dB
4	All emissions, radiated(30MHz~1GHz)	±2.64dB
5	All emissions, radiated(1GHz~6GHz)	±2.40dB
6	All emissions, radiated(> 6GHz)	±2.52dB
7	Temperature	±0.5°C
8	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	VR All-in-one-Headset
Trade Mark	Pimax
Model Name	Crystal
Family Model	N/A
Model Difference	N/A
FCC ID	2ARKN-CRYSTAL
Product Description	

IEEE 802.11 WLAN Mode Supported	☒802.11ax (20MHz channel bandwidth); ☒802.11ax (40MHz channel bandwidth); ☒802.11ax (80MHz channel bandwidth); ☒802.11ax (160MHz channel bandwidth);
Modulation	OFDMA (QPSK/BPSK/16QAM/64QAM/256QAM)
Operating Frequency Range	☒5955-7095MHz for 802.11ax(20MHz); ☒5965-7085MHz for 802.11ax(40MHz); ☒5985-7025MHz for 802.11ax(80MHz); ☒6025-6985MHz for 802.11ax(160MHz);
Number of Channels	☒58 channels for ax 20; ☒29 channels for ax 40; ☒14 channels for ax 80; ☒7 channels for ax 160;
Function:	☐Low-power Dual Client ☐Low-power Indoor Access Point ☐Subordinate Indoor Device ☒Low-power Indoor Client ☐Standard Power Access Point ☐Standard Client ☐Fixed Client
Smart system	☒MIMO for 802.11ax
Antenna Type	FPC Antenna
Antenna Gain	Ant1: 2.29dBi; Ant2: 1.26dBi

Based on the application, features, or specification exhibited in User's Manual, More details of EUT technical specification, please refer to the User's Manual.
The EUT is categorized as an Low-power Indoor Client (6XD) operating in the 5.925-7.125 GHz band. It will only operate under the control of a Low-power Indoor (LPI) access point (6ID).

Ratings	DC 3.8V from battery
Adapter	N/A
Battery	DC 3.8V, 6000mAh
Connecting I/O Port(s)	Please refer to the User's Manual
HW Version	V2.1
SW Version	V

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2.

20MHz					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	5955	81	6355	161	6755
5	5975	85	6375	165	6775
9	5995	89	6395	169	6795
13	6015	93	6415	173	6815
17	6035	97	6435	177	6835
21	6055	101	6455	181	6855
25	6075	105	6475	185	6875
29	6095	109	6495	189	6895
33	6115	113	6515	193	6915
37	6135	117	6535	197	6935
41	6155	121	6555	201	6955
45	6175	125	6575	205	6975
49	6195	129	6595	209	6995
53	6215	133	6615	213	7015
57	6235	137	6635	217	7035
61	6255	141	6655	221	7055
65	6275	145	6675	225	7075
69	6295	149	6695	229	7095
73	6315	153	6715		
77	6335	157	6735		

40MHz					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	5965	83	6365	163	6765
11	6005	91	6405	171	6805
19	6045	99	6445	179	6845
27	6085	107	6485	187	6885
35	6125	115	6525	195	6925
43	6165	123	6565	203	6965
51	6205	131	6605	211	7005
59	6245	139	6645	219	7045
67	6285	147	6685	227	7085
75	6325	155	6725		

80MHz					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
7	5985	87	6385	167	6785
23	6065	103	6465	183	6865
39	6145	119	6545	199	6945
55	6225	135	6625	215	7025
71	6305	151	6705		

160MHz					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
15	6025	111	6505	207	6985
47	6185	143	6665		
79	6345	175	6825		

1). CH111, CH115, CH119, CH175, CH185, CH187, CH183 is straddle channels.
2). For 20M Bandwidth, the CH233 (Center Frequency = 7115MHz) is not supported.

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Normal Link Mode
Mode 2	802.11ax 20 CH1/ CH45/ CH 93/ CH97/ CH105/ CH 113/ CH117/ CH149/ CH 181/ CH185/ CH189/ CH 209/ CH229
Mode 3	802.11ax 40 CH3/ CH 43/ CH 91/ CH99/ CH 107/ CH 115/ CH123/ CH 147/ CH 179/ CH187/ CH 195/ CH 211/ CH227
Mode 4	802.11ax 80 CH 7/ CH 39/ CH 87/ CH 103/ CH 119/ CH 135/ CH 151/ CH 167/ CH 183/ CH 199/ CH 215
Mode 5	802.11ax 160 CH 15/ CH 47/ CH 79/ CH 111/ CH 143/ CH 175/ CH 207

For Radiated Emission	
Final Test Mode	Description
Mode 1	Normal Link Mode
Mode 2	802.11ax 20 CH1/ CH45/ CH 93/ CH97/ CH105/ CH 113/ CH117/ CH149/ CH 181/ CH185/ CH189/ CH 209/ CH229
Mode 3	802.11ax 40 CH3/ CH 43/ CH 91/ CH99/ CH 107/ CH 115/ CH123/ CH 147/ CH 179/ CH187/ CH 195/ CH 211/ CH227
Mode 4	802.11ax 80 CH 7/ CH 39/ CH 87/ CH 103/ CH 119/ CH 135/ CH 151/ CH 167/ CH 183/ CH 199/ CH 215
Mode 5	802.11ax 160 CH 15/ CH 47/ CH 79/ CH 111/ CH 143/ CH 175/ CH 207

Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

(2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported

(3) In ax mode, RU allocation is not supported and it is a full carrier. Only the HE SU PPDU format operational mode.

(4) CH111, CH115, CH119, CH175, CH185, CH187, CH183 is straddle channels.

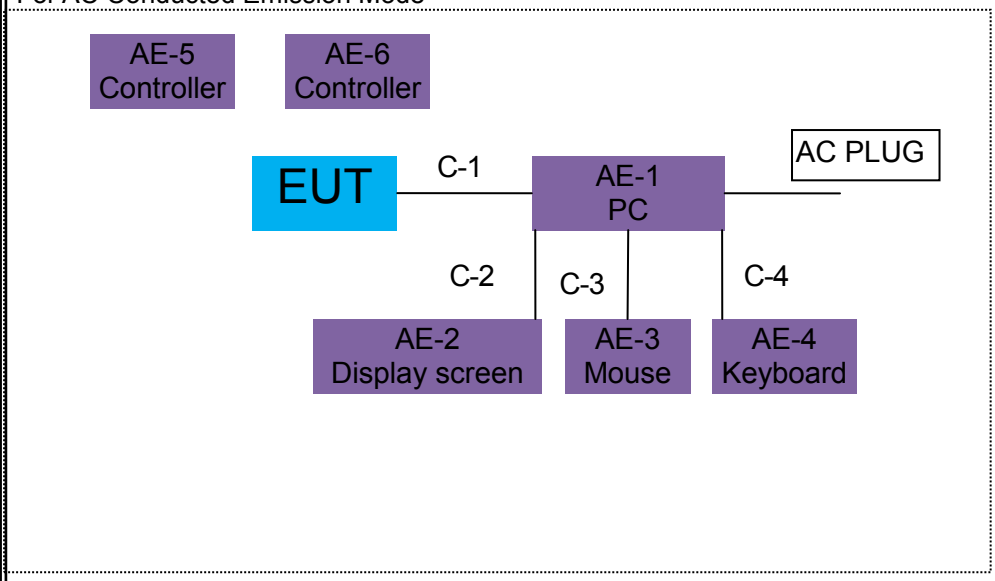
The EUT support MIMO modes, transmit mode what describe as following:

Mode	Tx / Rx
802.11ax (20MHz,40MHz,80MHz,160MHz)	2TX, 2RX

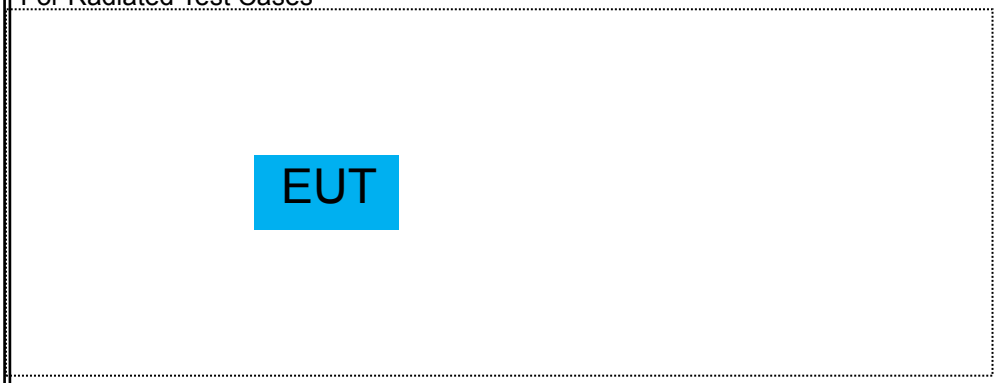
For 6GHz band, 802.11ax(20/40/80/160) has MIMO mode, Antenna 1,2 are simultaneous transmissions.
Directional gain=$G_{ANT\ MAX}$ + 10log(N_{ANT}/N_{ss})dBi=2.29 + 3.01 dBi = 5.3dBi
where NSS = the number of independent spatial streams of data and GANT MAX is the gain of the antenna having the highest gain (in dBi).
Note: Most devices can operate with one spatial stream (NSS = 1, where NSS is the number of spatial streams) even if they also are capable of more spatial streams. The worst case directional gain will occur when NSS = 1; therefore, it is especially important to ensure that the device complies with all emission limits for the case of NSS = 1 (or with the lowest possible value of NSS, if the device always uses spatial multiplexing).

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

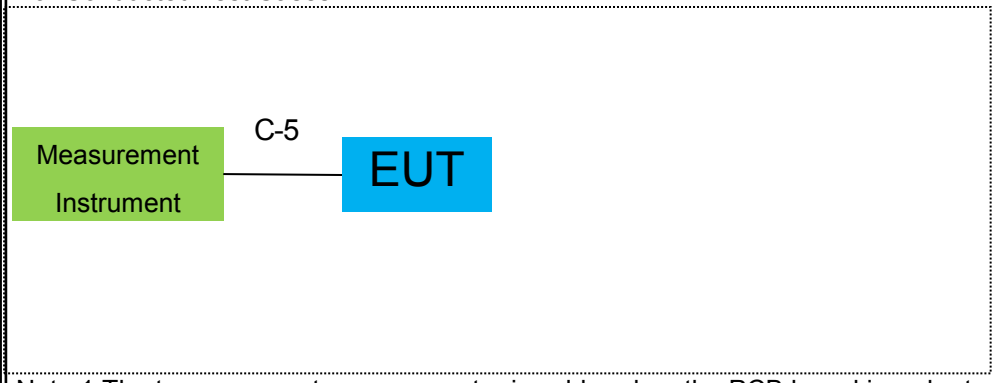
For AC Conducted Emission Mode



For Radiated Test Cases



For Conducted Test Cases



Note:1.The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Brand	Model/Type No.	Series No.	Note
AE-1	PC	N/A	N/A	N/A	Peripherals
AE-2	Display screen	N/A	N/A	N/A	Peripherals
AE-3	Mouse	N/A	N/A	N/A	Peripherals
AE-4	Keyboard	N/A	N/A	N/A	Peripherals
AE-5	Controller	N/A	N/A	N/A	Peripherals
AE-6	Controller	N/A	N/A	N/A	Peripherals

Item	Cable Type	Shielded Type	Ferrite Core	Length
C-1	3 in 1 Cable	NO	NO	5m
C-2	HDMI Cable	YES	YES	1.2m
C-3	Mouse Cable	NO	NO	1.2m
C-4	Keyboard Cable	NO	NO	1.2m
C-5	RF Cable	YES	NO	0.1m

Note:

(1) The support equipment was authorized by Declaration of Confirmation.

(2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation& Conducted Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4440A	MY41000130	2022.04.07 2023.03.27	2023.04.06 2024.03.26	1 year
2	Spectrum Analyzer	Agilent	N9020A	MY49100060	2022.06.16	2023.06.15	1 year
3	Spectrum Analyzer	R&S	FSV40	101417	2022.06.16	2023.06.15	1 year
4	Test Receiver	R&S	ESPI7	101318	2022.04.06 2023.03.27	2023.04.05 2024.03.26	1 year
5	Bilog Antenna	TESEQ	CBL6111D	31216	2022.03.30 2023.03.16	2023.03.29 2024.03.15	1 year
6	50Ω Coaxial Switch	Anritsu	MP59B	6200983705	2020.05.11 2023.05.06	2023.05.10 2026.05.05	3 year
7	Broadband Horn Antenna	SCHWARZBECK	BBHA 9120 D	2816	2023.01.12	2024.01.11	1 year
8	Amplifier	EMC	EMC051835SE	980246	2022.06.17	2023.06.16	1 year
9	Active Loop Antenna	SCHWARZBECK	FMZB 1519 B	055	2022.11.04	2023.11.03	1 year
10	USB RF Power Sensor	DARE	RPR3006W	15I00041SNO84	2022.06.16	2023.06.15	1 year
11	Test Cable (9KHz-30MHz)	N/A	R-01	N/A	2022.06.17	2025.06.16	3 year
12	Test Cable (30MHz-1GHz)	N/A	R-02	N/A	2022.06.17	2025.06.16	3 year
13	High Test Cable(1G-40GHz)	N/A	R-03	N/A	2022.06.17	2025.06.16	3 year
14	High Test Cable(1G-40GHz)	N/A	R-04	N/A	2022.06.17	2025.06.16	3 year
15	temporary antenna connector (Note)	NTS	R001	N/A	N/A	N/A	N/A
16	Low Noise Amplifier	B&Z	BZ-P540-550850-452727	16476-11729	2022.02.21 2023.02.19	2023.02.20 2024.02.18	1 year
17	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	803	2022.11.07	2023.11.06	1 year
18	Thermal Chamber	Ten Billion	TTC-B3C	TBN-960502	2020.08.07	2023.08.06	3 year
19	MXG Vector Signal Generator	Keysight	N5182B	MY57301482	2022.11.08	2023.11.07	1 year
20	N5182BU Frequency Extender	Keysight	N5182BX07	MY57301203	2022.11.08	2023.11.07	1 year

Note:
We will use the temporary antenna connector (soldered on the PCB board) When conducted test
And this temporary antenna connector is listed within the instrument list

AC Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2022.04.06 2023.03.27	2023.04.05 2024.03.26	1 year
2	LISN	R&S	ENV216	101313	2022.04.06 2023.03.27	2023.04.05 2024.03.26	1 year
3	LISN	SCHWARZBECK	NNLK 8129	8129245	2022.04.06 2023.03.27	2023.04.05 2024.03.26	1 year
4	50Ω Coaxial Switch	ANRITSU CORP	MP59B	6200983704	2020.05.11 2023.05.06	2023.05.10 2026.05.05	3 year
5	Test Cable (9KHz-30MHz)	N/A	C01	N/A	2020.05.11 2023.05.09	2023.05.10 2026.05.08	3 year
6	Test Cable (9KHz-30MHz)	N/A	C02	N/A	2020.05.11 2023.05.09	2023.05.10 2026.05.08	3 year
7	Test Cable (9KHz-30MHz)	N/A	C03	N/A	2020.05.11 2023.05.09	2023.05.10 2026.05.08	3 year

Note: Each piece of equipment is scheduled for calibration once a year except the Test Cable& Aux Equipment which is scheduled for calibration every 3 years.

3. TEST REQUIREMENTS

3.1CONDUCTED EMISSION MEASUREMENT

3.1.1 APPLICABLE STANDARD

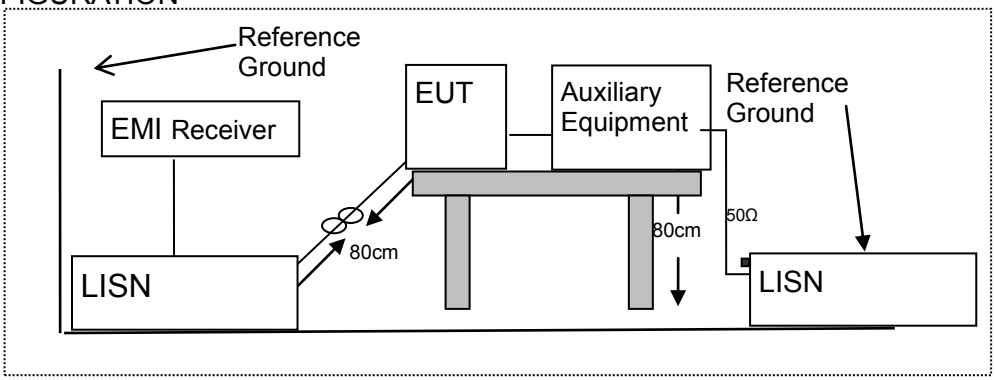
According to FCC Part 15.207(a)

3.1.2 CONFORMANCE LIMIT

Frequency(MHz)	Conducted Emission Limit	
	Quasi-peak	Average
0.15-0.5	66-56*	56-46*
0.5-5.0	56	46
5.0-30.0	60	50

Note: 1. *Decreases with the logarithm of the frequency
2. The lower limit shall apply at the transition frequencies
3. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

3.1.3 TEST CONFIGURATION



3.1.4 TEST PROCEDURE

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room.
2. The EUT was placed on a table which is 0.8m above ground plane.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
4. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40cm long.
5. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
6. LISN at least 80 cm from nearest part of EUT chassis.
7. The frequency range from 150KHz to 30MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth(IF bandwidth=9KHz) with Maximum Hold Mode
9. For the actual test configuration, please refer to the related Item –EUT Test Photos.

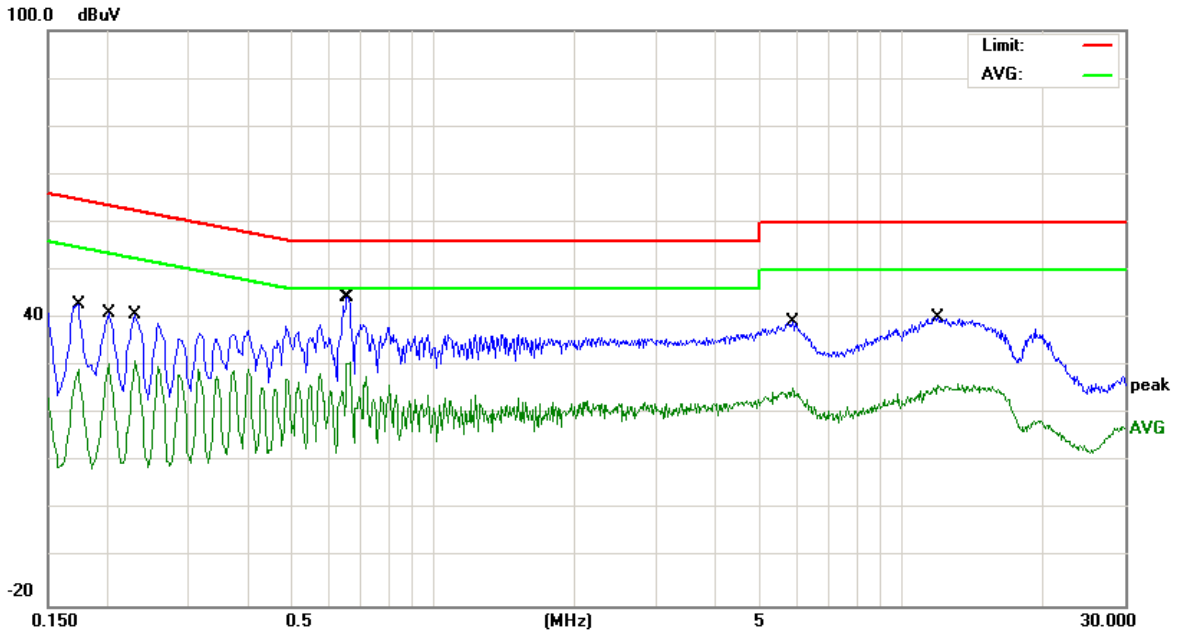
3.1.5 TEST RESULTS

EUT：	VR All-in-one-Headset	Model Name ：	Crystal
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 3.8V powered by Battery	Test Mode：	Mode 3

802.11ax40 MIMO mode CH3

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1740	33.31	9.55	42.86	64.76	-21.90	QP
0.1740	19.71	9.55	29.26	54.76	-25.50	AVG
0.2020	31.60	9.55	41.15	63.52	-22.37	QP
0.2020	20.91	9.55	30.46	53.52	-23.06	AVG
0.2300	31.34	9.55	40.89	62.45	-21.56	QP
0.2300	21.58	9.55	31.13	52.45	-21.32	AVG
0.6540	34.87	9.55	44.42	56.00	-11.58	QP
0.6620	21.35	9.55	30.90	46.00	-15.10	AVG
5.8539	29.60	9.64	39.24	60.00	-20.76	QP
5.8539	15.75	9.64	25.39	50.00	-24.61	AVG
11.9899	30.46	9.73	40.19	60.00	-19.81	QP
11.9899	16.20	9.73	25.93	50.00	-24.07	AVG

Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



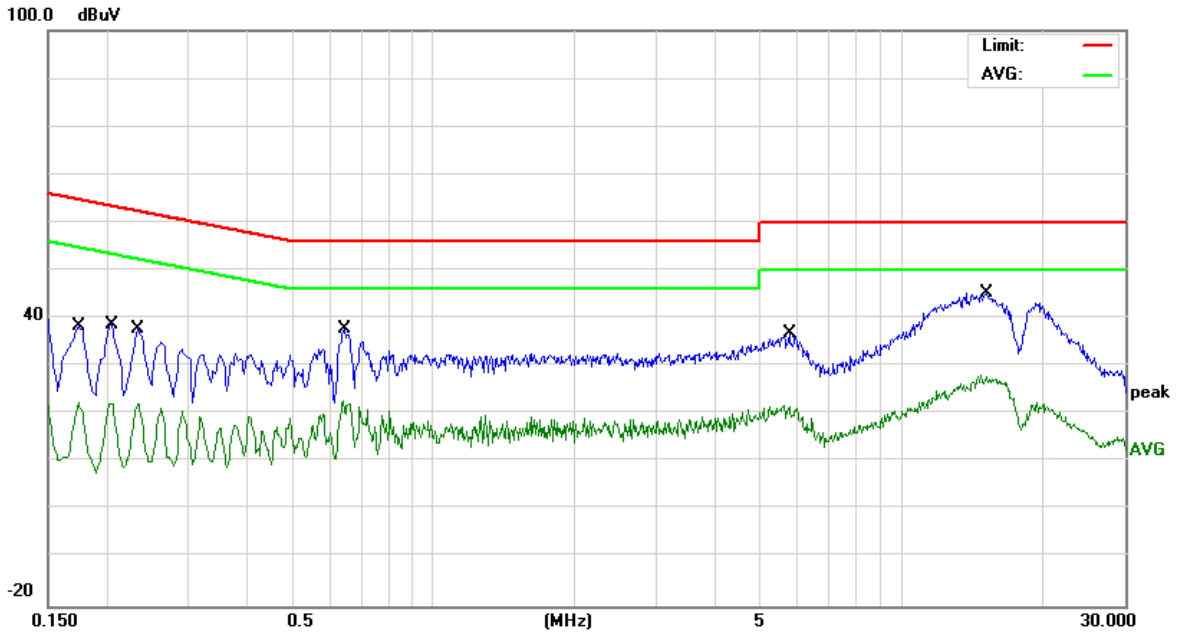
Note: The test report records only the worst-case test values.

EUT :	VR All-in-one-Headset	Model Name :	Crystal
Temperature :	26 ℃	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	DC 3.8V powered by Battery	Test Mode :	Mode 3

802.11ax40 MIMO mode CH3

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1739	28.69	9.55	38.24	64.77	-26.53	QP
0.1739	12.83	9.55	22.38	54.77	-32.39	AVG
0.2059	29.04	9.54	38.58	63.37	-24.79	QP
0.2059	12.75	9.54	22.29	53.37	-31.08	AVG
0.2340	28.18	9.54	37.72	62.30	-24.58	QP
0.2340	12.75	9.54	22.29	52.30	-30.01	AVG
0.6419	28.33	9.54	37.87	56.00	-18.13	QP
0.6419	13.22	9.54	22.76	46.00	-23.24	AVG
5.7579	27.29	9.63	36.92	60.00	-23.08	QP
5.7579	12.26	9.63	21.89	50.00	-28.11	AVG
15.1938	35.49	9.76	45.25	60.00	-14.75	QP
15.1938	18.32	9.76	28.08	50.00	-21.92	AVG

Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



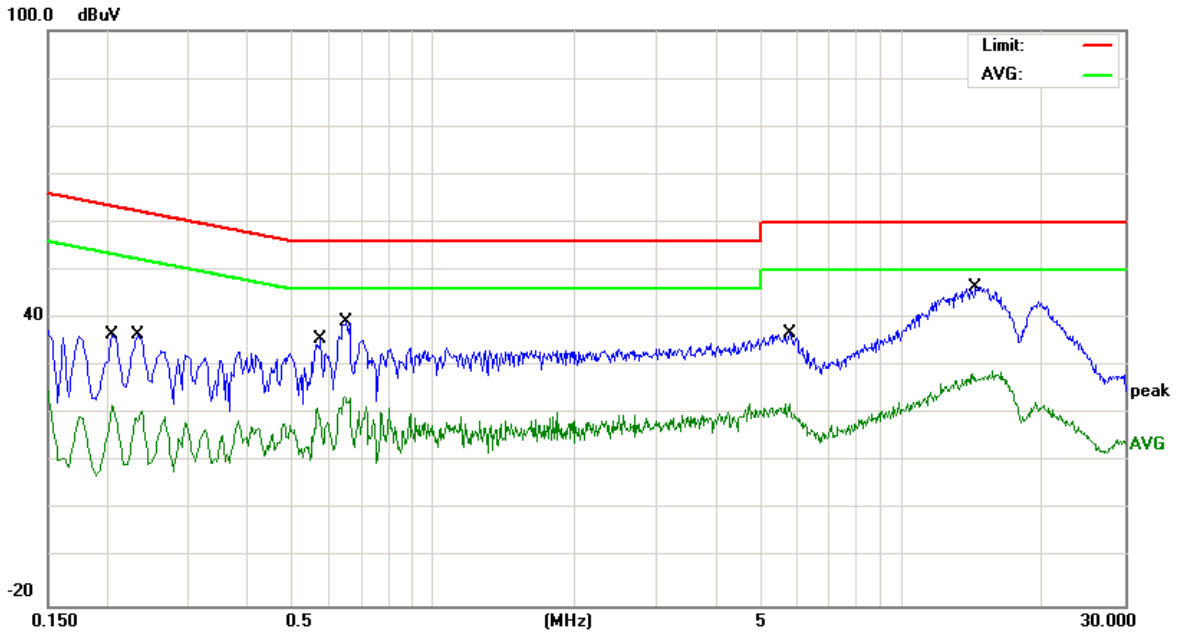
Note: The test report records only the worst-case test values.

EUT :	VR All-in-one-Headset	Model Name :	Crystal
Temperature :	26 ℃	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	L
Test Voltage :	DC 3.8V powered by Battery	Test Mode :	Mode 2

802.11ax20 MIMO mode CH97

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.2060	27.04	9.54	36.58	63.36	-26.78	QP
0.2060	12.17	9.54	21.71	53.36	-31.65	AVG
0.2340	27.00	9.54	36.54	62.30	-25.76	QP
0.2340	9.70	9.54	19.24	52.30	-33.06	AVG
0.5740	25.99	9.54	35.53	56.00	-20.47	QP
0.5740	11.58	9.54	21.12	46.00	-24.88	AVG
0.6540	29.72	9.54	39.26	56.00	-16.74	QP
0.6540	14.24	9.54	23.78	46.00	-22.22	AVG
5.8019	27.21	9.63	36.84	60.00	-23.16	QP
5.8019	12.55	9.63	22.18	50.00	-27.82	AVG
14.4339	36.76	9.75	46.51	60.00	-13.49	QP
14.4339	17.93	9.75	27.68	50.00	-22.32	AVG

Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



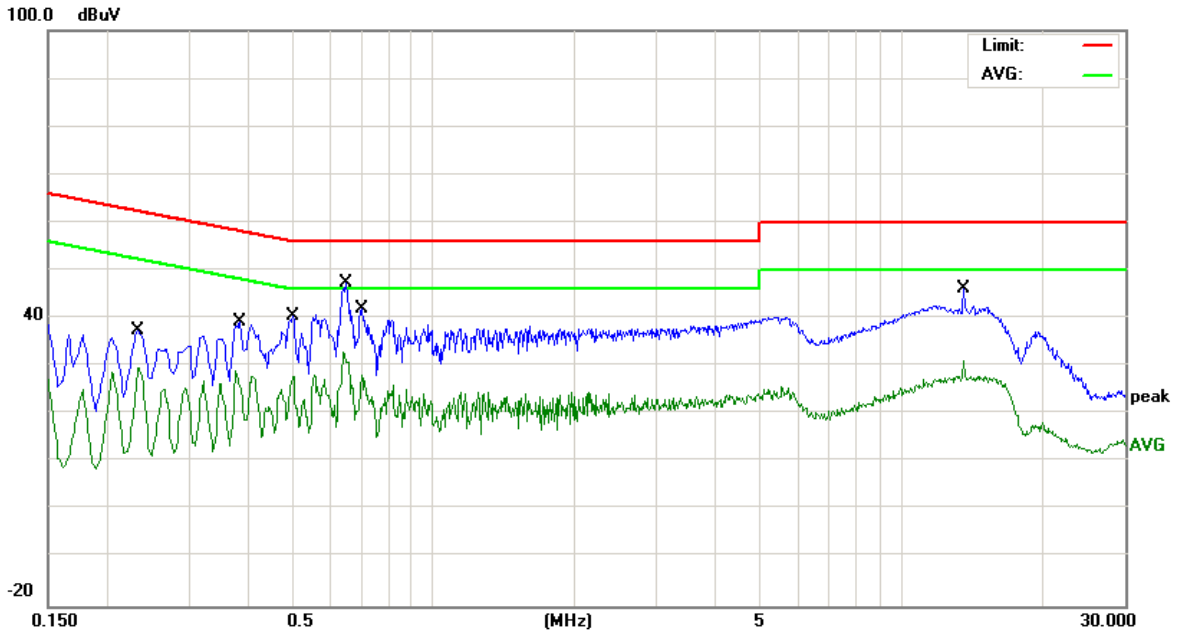
Note: The test report records only the worst-case test values.

EUT :	VR All-in-one-Headset	Model Name :	Crystal
Temperature :	26 ℃	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	DC 3.8V powered by Battery	Test Mode :	Mode 2

802.11ax20 MIMO mode CH97

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.2340	27.99	9.55	37.54	62.30	-24.76	QP
0.2340	20.04	9.55	29.59	52.30	-22.71	AVG
0.3860	29.82	9.55	39.37	58.15	-18.78	QP
0.3860	19.02	9.55	28.57	48.15	-19.58	AVG
0.5020	30.89	9.55	40.44	56.00	-15.56	QP
0.5020	18.30	9.55	27.85	46.00	-18.15	AVG
0.6500	37.85	9.55	47.40	56.00	-8.60	QP
0.6500	23.45	9.55	33.00	46.00	-13.00	AVG
0.7019	32.45	9.55	42.00	56.00	-14.00	QP
0.7019	18.60	9.55	28.15	46.00	-17.85	AVG
13.5659	36.38	9.75	46.13	60.00	-13.87	QP
13.5659	21.54	9.75	31.29	50.00	-18.71	AVG

Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



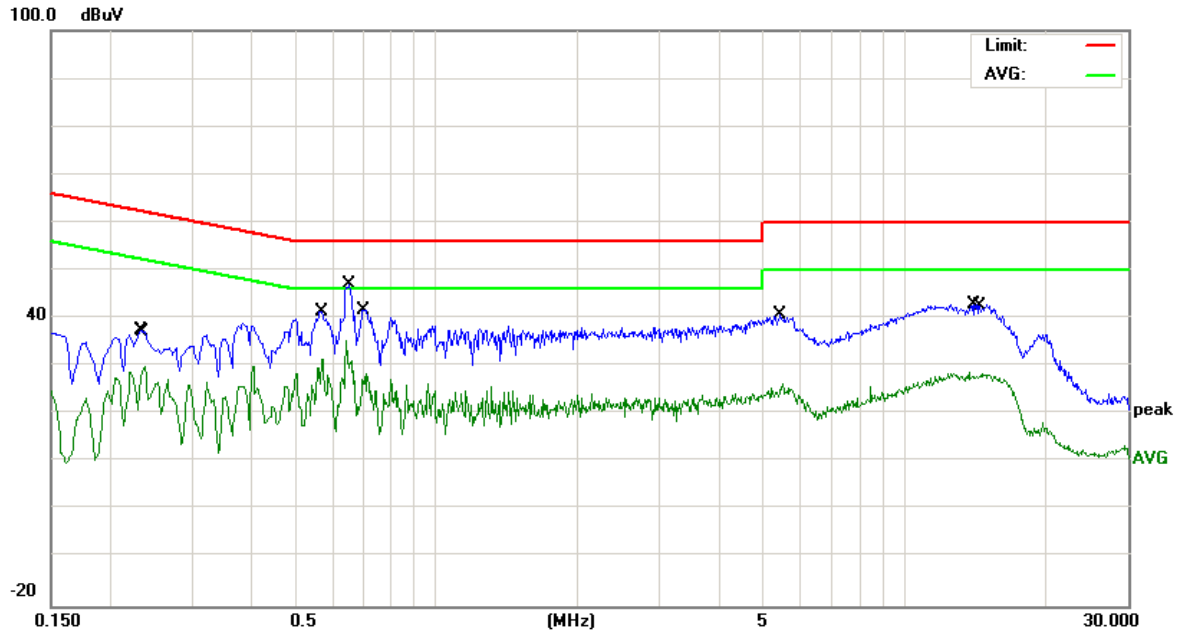
Note: The test report records only the worst-case test values.

EUT：	VR All-in-one-Headset	Model Name ：	Crystal
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 3.8V powered by Battery	Test Mode：	Mode 2

802.11ax20 MIMO mode CH149

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.2340	27.81	9.55	37.36	62.30	-24.94	QP
0.2380	20.33	9.55	29.88	52.16	-22.28	AVG
0.5700	31.90	9.55	41.45	56.00	-14.55	QP
0.5700	21.84	9.55	31.39	46.00	-14.61	AVG
0.6540	37.48	9.55	47.03	56.00	-8.97	QP
0.6540	25.94	9.55	35.49	46.00	-10.51	AVG
0.6980	32.16	9.55	41.71	56.00	-14.29	QP
0.6980	18.95	9.55	28.50	46.00	-17.50	AVG
5.4379	31.19	9.62	40.81	60.00	-19.19	QP
5.4979	16.64	9.62	26.26	50.00	-23.74	AVG
14.0739	33.19	9.76	42.95	60.00	-17.05	QP
14.6259	18.77	9.77	28.54	50.00	-21.46	AVG

Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



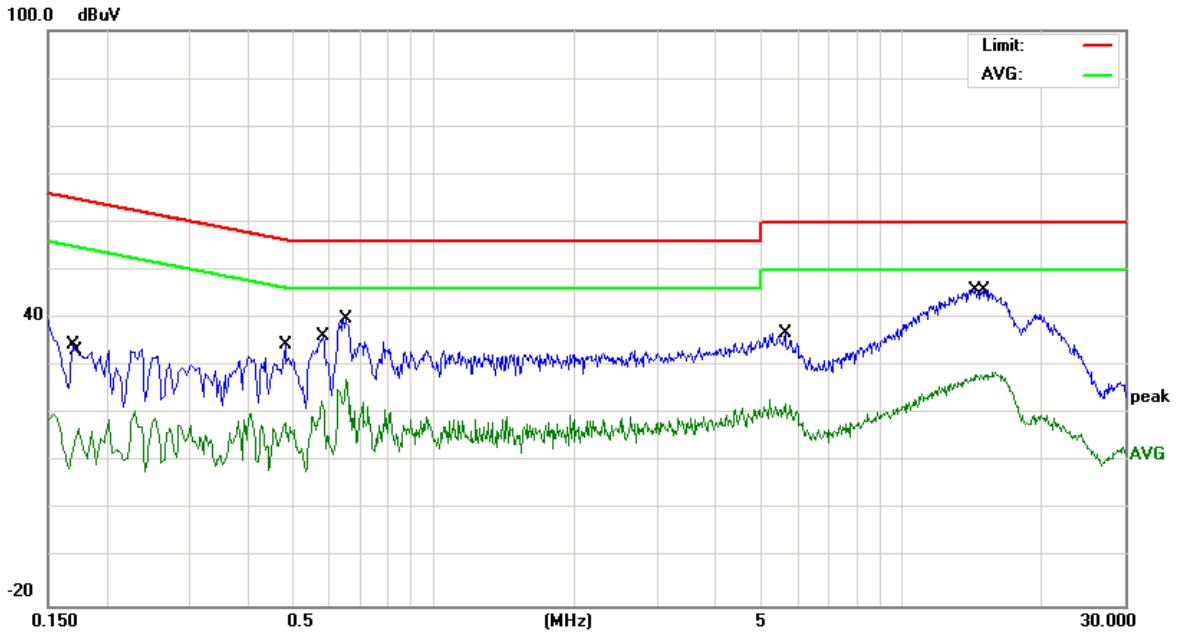
Note: The test report records only the worst-case test values.

EUT :	VR All-in-one-Headset	Model Name :	Crystal
Temperature :	26 ℃	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	DC 3.8V powered by Battery	Test Mode :	Mode 2

802.11ax20 MIMO mode CH149

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1700	24.80	9.55	34.35	64.96	-30.61	QP
0.1740	7.43	9.55	16.98	54.76	-37.78	AVG
0.4820	24.90	9.54	34.44	56.30	-21.86	QP
0.4820	8.73	9.54	18.27	46.30	-28.03	AVG
0.5820	26.58	9.54	36.12	56.00	-19.88	QP
0.5820	13.33	9.54	22.87	46.00	-23.13	AVG
0.6500	30.27	9.54	39.81	56.00	-16.19	QP
0.6500	17.85	9.54	27.39	46.00	-18.61	AVG
5.6299	27.13	9.62	36.75	60.00	-23.25	QP
5.6299	12.58	9.62	22.20	50.00	-27.80	AVG
14.3219	36.18	9.74	45.92	60.00	-14.08	QP
14.7499	18.52	9.75	28.27	50.00	-21.73	AVG

Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



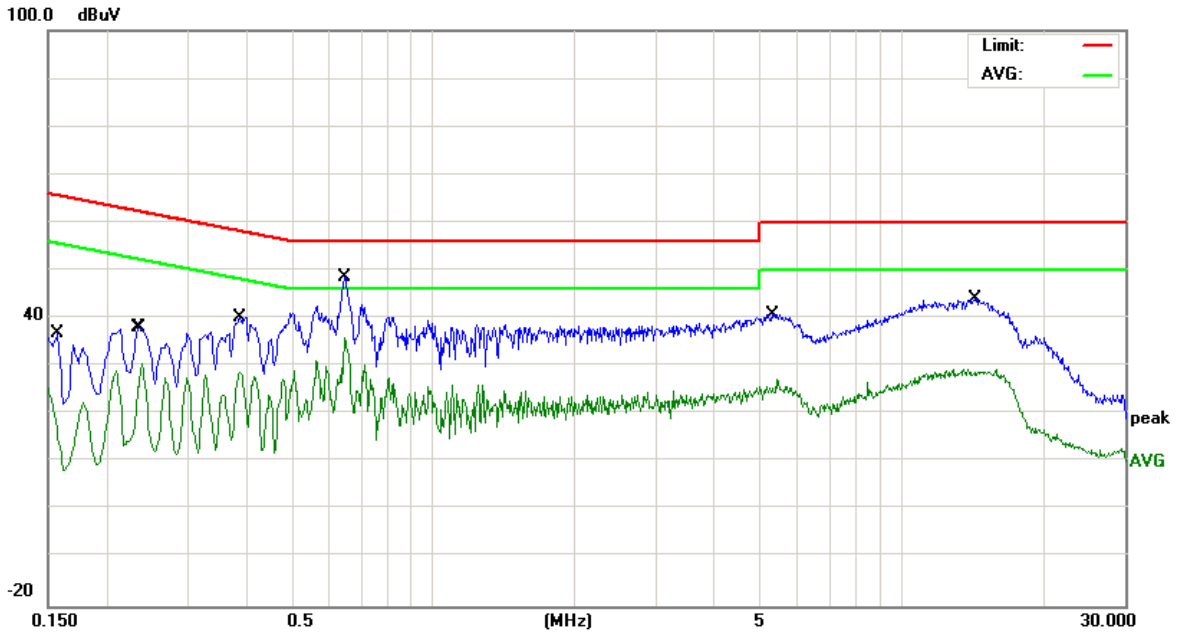
Note: The test report records only the worst-case test values.

EUT：	VR All-in-one-Headset	Model Name ：	Crystal
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 3.8V powered by Battery	Test Mode：	Mode 2

802.11ax20 MIMO mode CH209

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1580	27.19	9.56	36.75	65.56	-28.81	QP
0.1580	9.05	9.56	18.61	55.56	-36.95	AVG
0.2340	28.59	9.55	38.14	62.30	-24.16	QP
0.2379	20.95	9.55	30.50	52.17	-21.67	AVG
0.3860	30.60	9.55	40.15	58.15	-18.00	QP
0.3860	19.12	9.55	28.67	48.15	-19.48	AVG
0.6460	39.02	9.55	48.57	56.00	-7.43	QP
0.6460	26.29	9.55	35.84	46.00	-10.16	AVG
5.2899	31.14	9.62	40.76	60.00	-19.24	QP
5.2899	16.26	9.62	25.88	50.00	-24.12	AVG
14.4338	34.38	9.76	44.14	60.00	-15.86	QP
14.4338	19.10	9.76	28.86	50.00	-21.14	AVG

Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



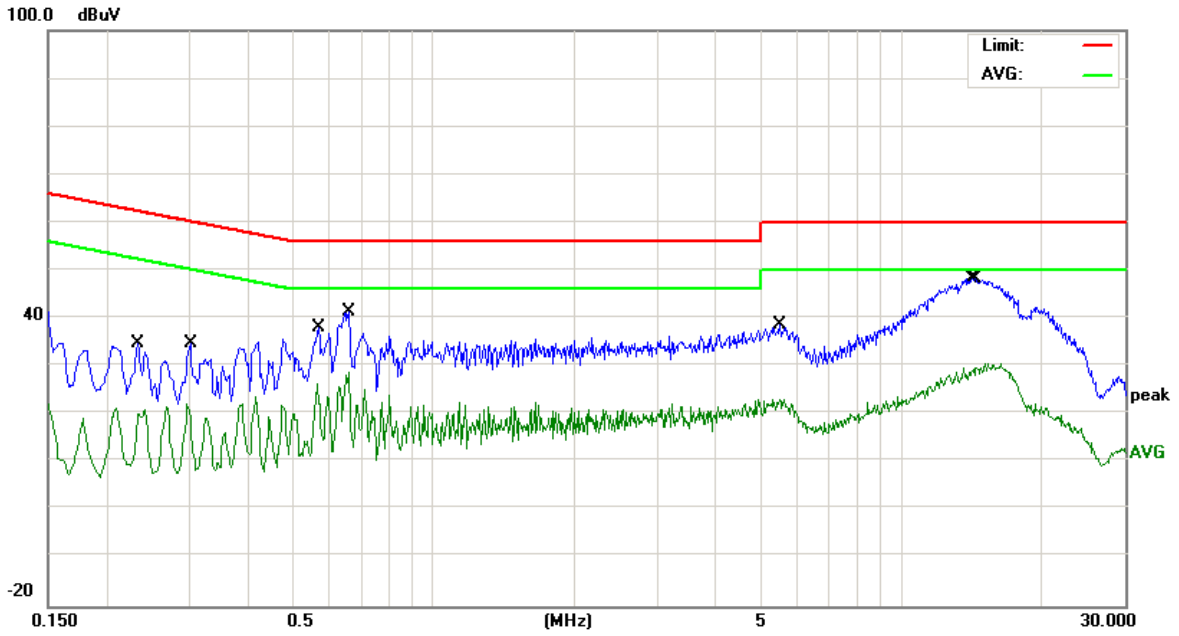
Note: The test report records only the worst-case test values.

EUT :	VR All-in-one-Headset	Model Name :	Crystal
Temperature :	26 ℃	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	DC 3.8V powered by Battery	Test Mode :	Mode 2

802.11ax20 MIMO mode CH209

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.2340	25.30	9.54	34.84	62.30	-27.46	QP
0.2340	10.40	9.54	19.94	52.30	-32.36	AVG
0.3019	25.17	9.53	34.70	60.19	-25.49	QP
0.3019	12.66	9.53	22.19	50.19	-28.00	AVG
0.5699	28.61	9.54	38.15	56.00	-17.85	QP
0.5699	16.83	9.54	26.37	46.00	-19.63	AVG
0.6580	31.74	9.54	41.28	56.00	-14.72	QP
0.6580	19.12	9.54	28.66	46.00	-17.34	AVG
5.4818	28.91	9.61	38.52	60.00	-21.48	QP
5.4818	13.50	9.61	23.11	50.00	-26.89	AVG
14.1458	38.59	9.74	48.33	60.00	-11.67	QP
14.5099	19.93	9.75	29.68	50.00	-20.32	AVG

Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



Note: The test report records only the worst-case test values.

3.2 RADIATED EMISSION MEASUREMENT

3.2.1 APPLICABLE STANDARD

According to FCC Part 15.407(b) and 15.209

3.2.2 CONFORMANCE LIMIT

According to FCC Part 15.407(b)(10): radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

According to FCC Part15.205, Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
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	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			

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Restricted Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance
0.009~0.490	2400/F(KHz)	20 log (uV/m)	300
0.490~1.705	24000/F(KHz)	20 log (uV/m)	30
1.705~30.0	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Limits of Radiated Emission Measurement(Above 1000MHz)

Frequency(MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

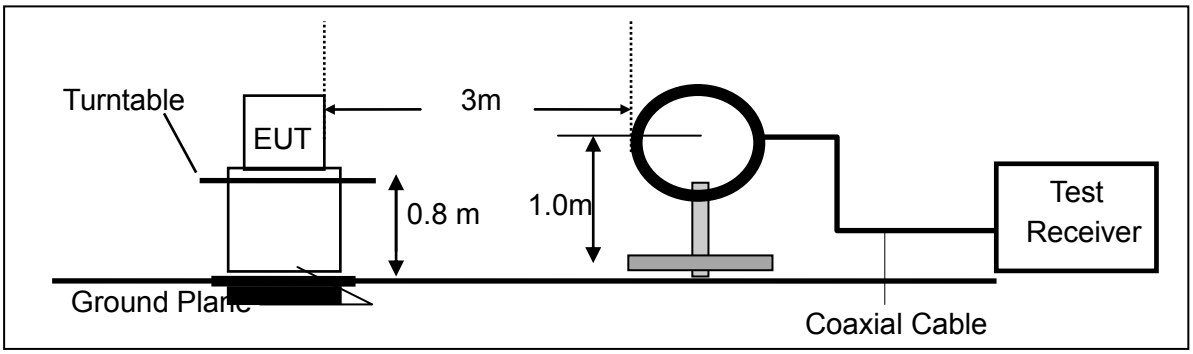
Remark :1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. For Frequency 9kHz~30MHz:
Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.
For Frequency above 30MHz:
Distance extrapolation factor =20log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.

3.2.3 MEASURING INSTRUMENTS

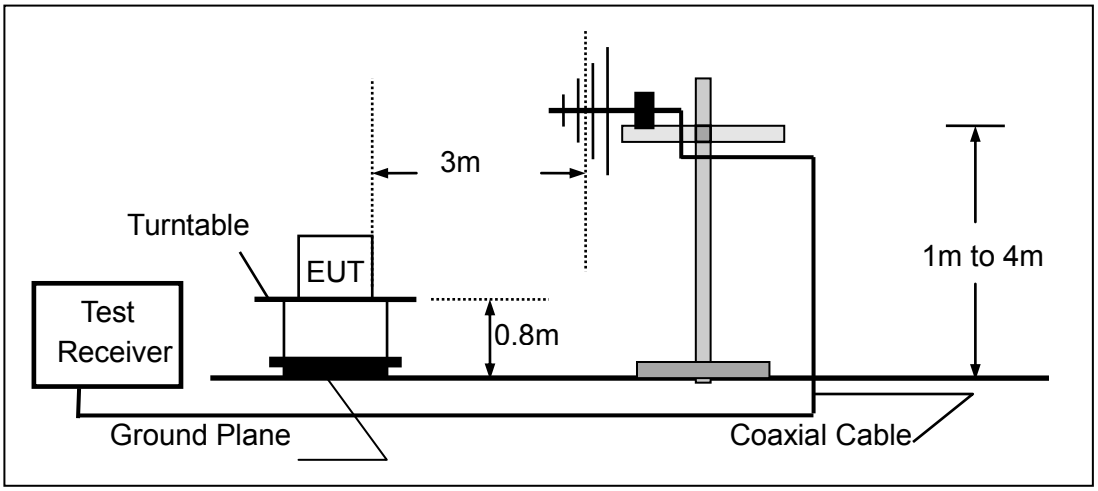
The Measuring equipment is listed in the section 6.3 of this test report.

3.2.4 TEST CONFIGURATION

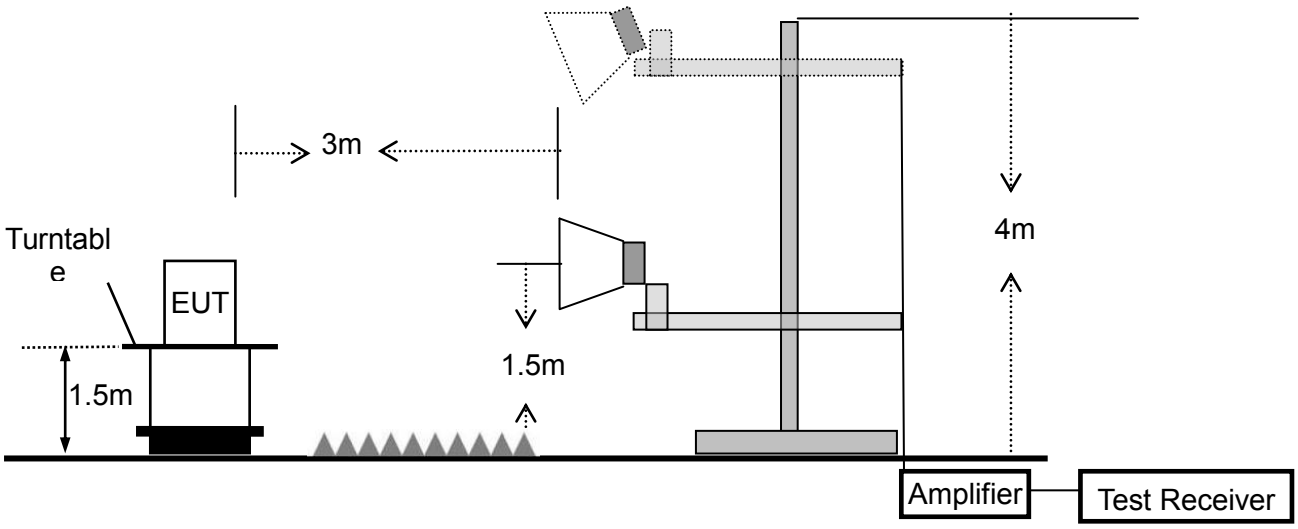
(a) For radiated emissions below 30MHz



(b) For radiated emissions from 30MHz to 1000MHz



(c) For radiated emissions above 1000MHz



3.2.5 TEST PROCEDURE

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10-2013. The test distance is 3m.The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.
This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT.
Use the following spectrum analyzer settings:

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 m for below 1GHz and 1.5m for above 1GHz the ground at a 3 meter. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m for below 1GHz and 1.5m for above 1GHz; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	1 MHz
	Average	1 MHz	10 Hz

Note: for the frequency ranges below 30 MHz, a narrower RBW is used for these ranges but the measured value should add a RBW correction factor (RBWCF) where RBWCF [dB] =10*lg(100 [kHz]/narrower RBW [kHz]). , the narrower RBW is 1 kHz and RBWCF is 20 dB for the frequency 9 kHz to 150 kHz, and the narrower RBW is 10 kHz and RBWCF is 10 dB for the frequency 150 kHz to 30 MHz.

3.2.6 TEST RESULTS (9KHZ – 30 MHZ)

EUT：	VR All-in-one-Headset	Model Name. :	Crystal
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 3.8V
Test Mode ：	TX	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	N/A
--	--	--	--	N/A

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

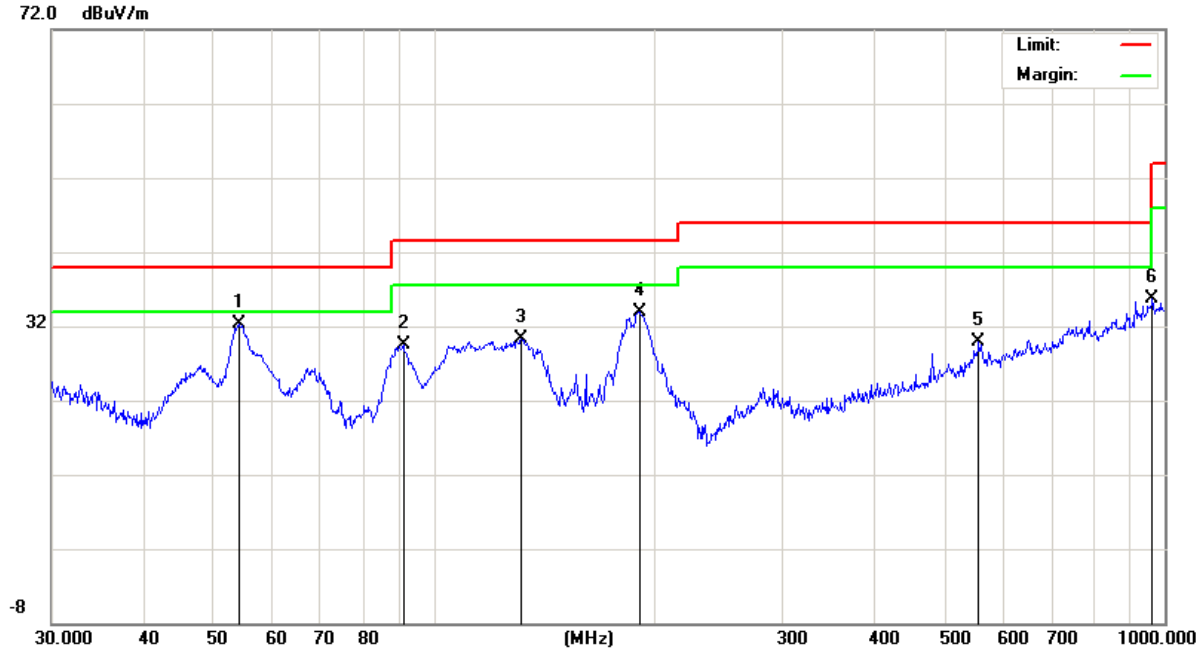
3.2.7 TEST RESULTS (30MHZ – 1GHZ)

EUT :	VR All-in-one-Headset	Model Name. :	Crystal
Temperature :	20 ℃	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.8V
Test Mode :	Mode 3 (802.11ax40 MIMO mode CH3)		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
V	54.0711	25.23	7.14	32.37	40.00	-7.63	QP
V	90.8554	19.71	9.89	29.60	43.50	-13.90	QP
V	131.7575	17.78	12.54	30.32	43.50	-13.18	QP
V	191.7450	24.85	9.05	33.90	43.50	-9.60	QP
V	556.7744	7.44	22.44	29.88	46.00	-16.12	QP
V	962.1621	7.40	28.40	35.80	54.00	-18.20	QP

Remark:

Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit

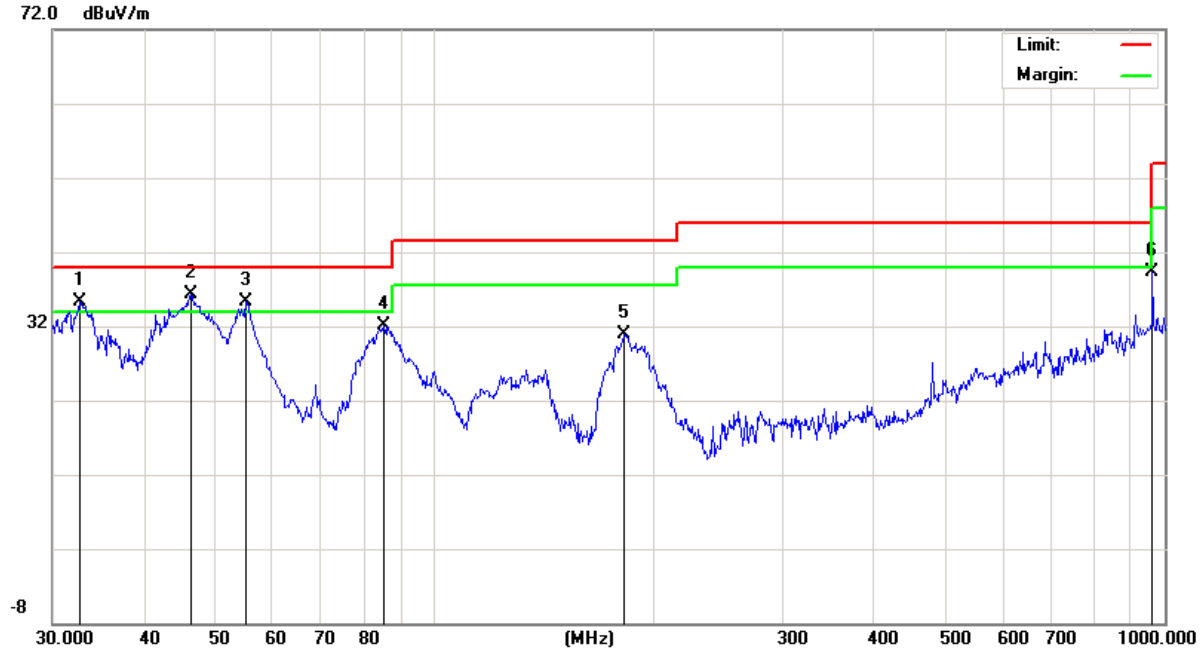


Note: The test report records only the worst-case test values.

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
H	32.7486	17.62	17.60	35.22	40.00	-4.78	QP
H	46.3402	25.53	10.69	36.22	40.00	-3.78	QP
H	55.2207	28.62	6.73	35.35	40.00	-4.65	QP
H	85.2980	23.05	9.07	32.12	40.00	-7.88	QP
H	181.9200	20.92	9.91	30.83	43.50	-12.67	QP
H	962.1621	10.96	28.40	39.36	54.00	-14.64	QP

Remark:

Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit



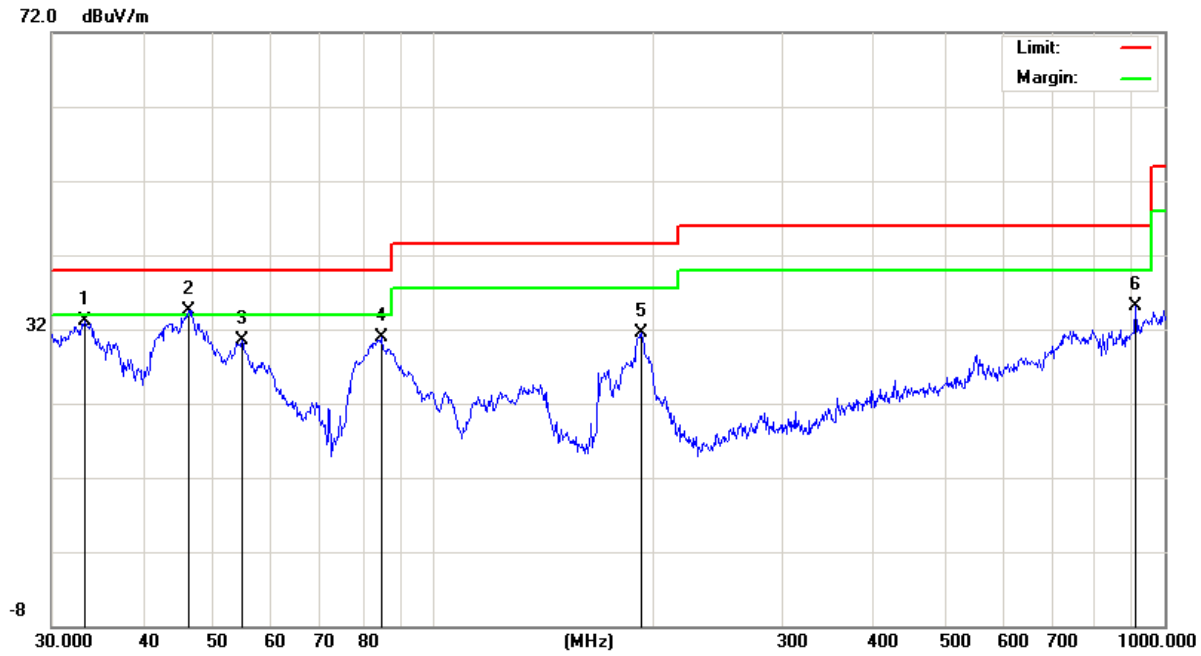
Note: The test report records only the worst-case test values.

EUT :	VR All-in-one-Headset	Model Name. :	Crystal
Temperature :	20 ℃	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.8V
Test Mode :	Mode 2 (802.11ax20 MIMO mode CH97)		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
V	33.3278	15.67	17.48	33.15	40.00	-6.85	QP
V	46.1779	23.84	10.69	34.53	40.00	-5.47	QP
V	54.6428	23.63	6.93	30.56	40.00	-9.44	QP
V	84.7018	22.09	8.87	30.96	40.00	-9.04	QP
V	192.4185	22.54	8.98	31.52	43.50	-11.98	QP
V	912.8619	8.36	26.84	35.20	46.00	-10.80	QP

Remark:

Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit

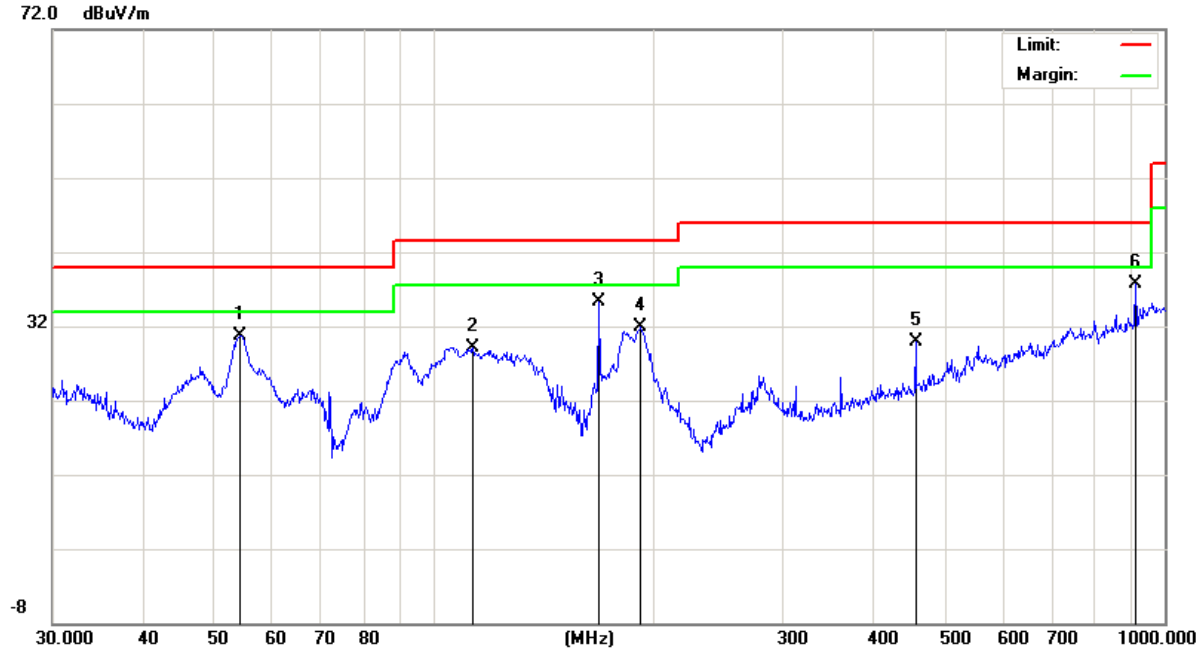


Note: The test report records only the worst-case test values.

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
H	54.2610	23.61	7.07	30.68	40.00	-9.32	QP
H	112.9196	17.25	11.92	29.17	43.50	-14.33	QP
H	167.8243	24.52	10.72	35.24	43.50	-8.26	QP
H	191.7450	22.79	9.05	31.84	43.50	-11.66	QP
H	455.9058	11.10	18.89	29.99	46.00	-16.01	QP
H	912.8619	10.90	26.84	37.74	46.00	-8.26	QP

Remark:

Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit



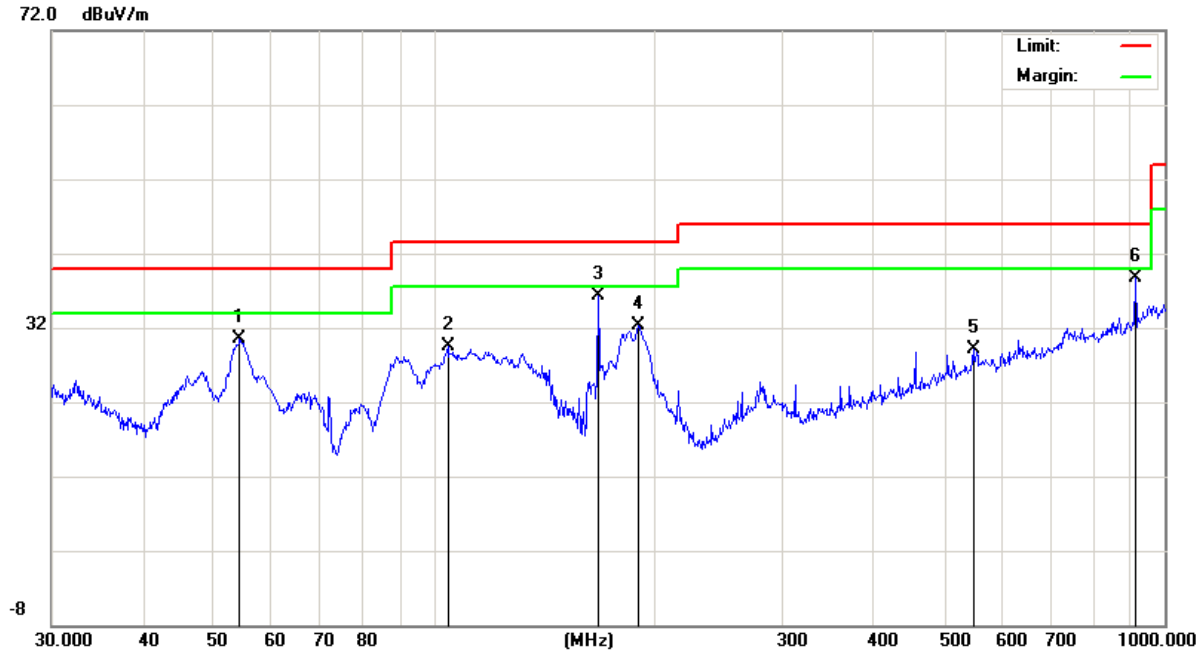
Note: The test report records only the worst-case test values.

EUT :	VR All-in-one-Headset	Model Name. :	Crystal
Temperature :	20 ℃	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.8V
Test Mode :	Mode 2 (802.11ax20 MIMO mode CH149)		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
V	54.2610	23.50	7.07	30.57	40.00	-9.43	QP
V	104.5361	18.32	11.09	29.41	43.50	-14.09	QP
V	167.8243	25.62	10.72	36.34	43.50	-7.16	QP
V	190.4050	23.08	9.16	32.24	43.50	-11.26	QP
V	547.0977	6.84	22.33	29.17	46.00	-16.83	QP
V	912.8619	11.91	26.84	38.75	46.00	-7.25	QP

Remark:

Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit

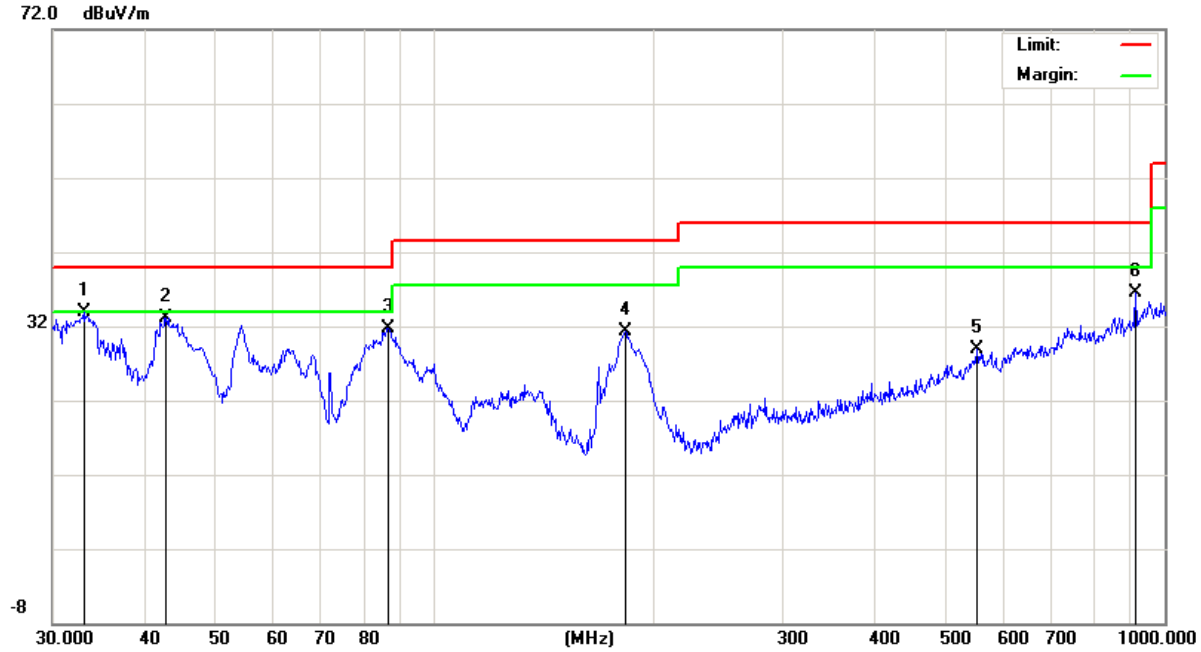


Note: The test report records only the worst-case test values.

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
H	33.0949	16.32	17.53	33.85	40.00	-6.15	QP
H	42.8997	20.77	12.36	33.13	40.00	-6.87	QP
H	86.5029	22.46	9.29	31.75	40.00	-8.25	QP
H	182.5592	21.44	9.86	31.30	43.50	-12.20	QP
H	552.8832	6.37	22.54	28.91	46.00	-17.09	QP
H	912.8619	9.72	26.84	36.56	46.00	-9.44	QP

Remark:

Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit



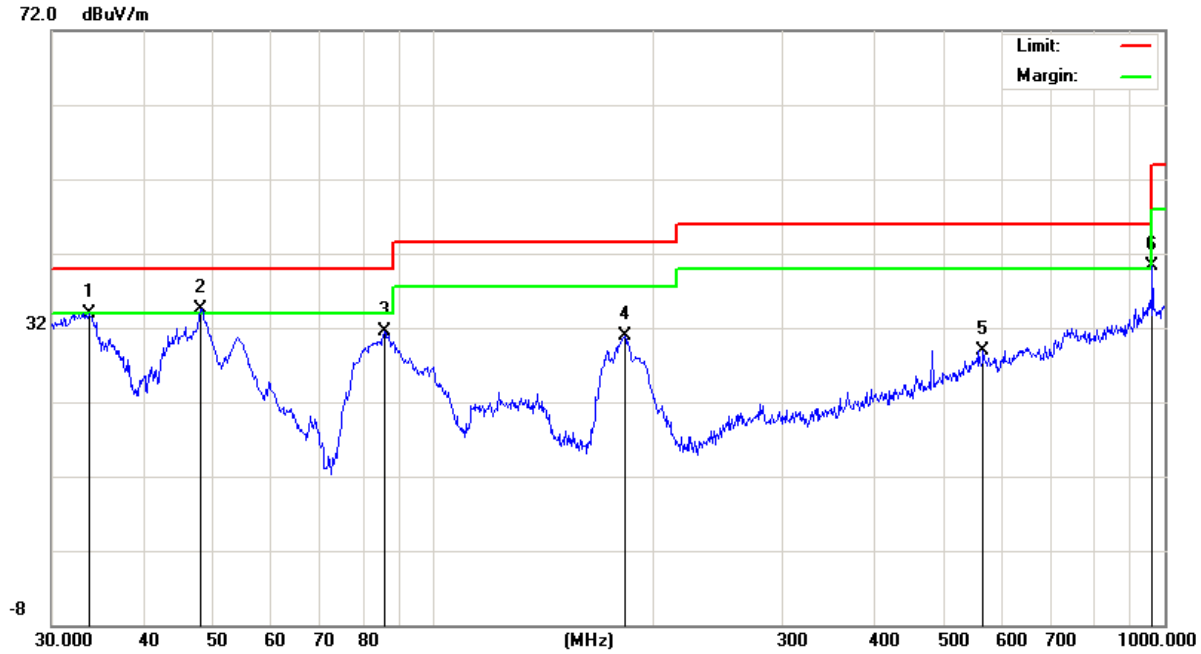
Note: The test report records only the worst-case test values.

EUT :	VR All-in-one-Headset	Model Name. :	Crystal
Temperature :	20 ℃	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.8V
Test Mode :	Mode 2 (802.11ax20 MIMO mode CH209)		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
V	33.7986	16.47	17.37	33.84	40.00	-6.16	QP
V	47.9939	23.72	10.86	34.58	40.00	-5.42	QP
V	85.5977	22.32	9.18	31.50	40.00	-8.50	QP
V	182.5592	21.02	9.86	30.88	43.50	-12.62	QP
V	564.6389	6.74	22.12	28.86	46.00	-17.14	QP
V	962.1622	11.82	28.40	40.22	54.00	-13.78	QP

Remark:

Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit

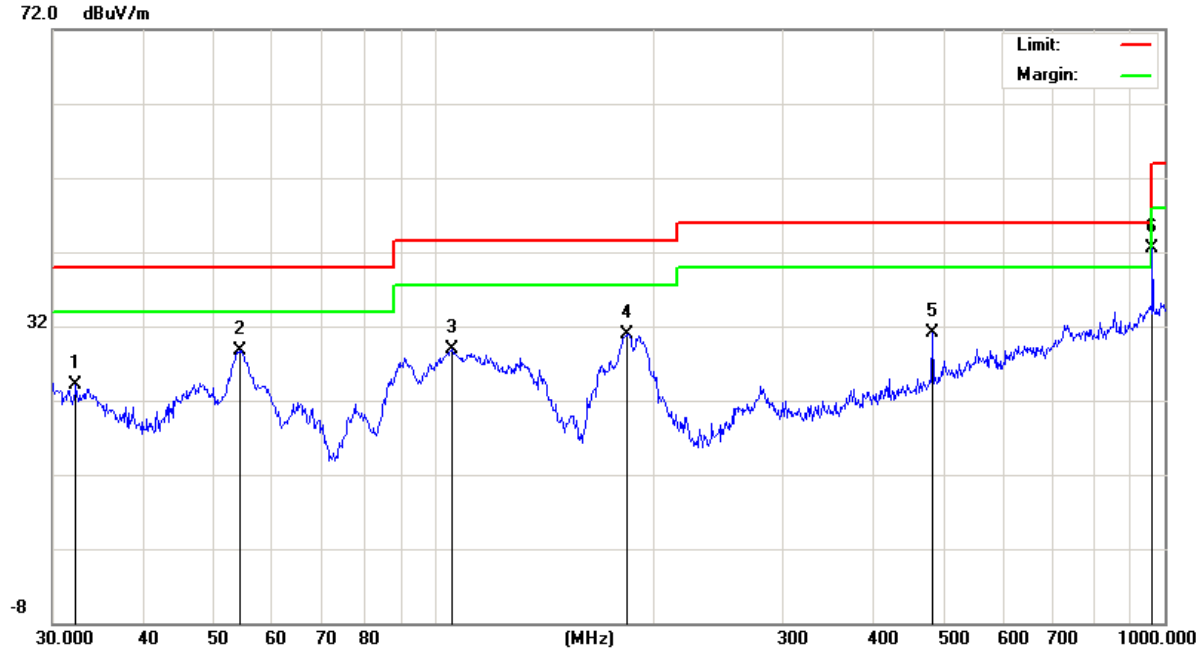


Note: The test report records only the worst-case test values.

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
H	32.2924	6.40	17.72	24.12	40.00	-15.88	QP
H	54.2610	21.69	7.07	28.76	40.00	-11.24	QP
H	105.6415	17.79	11.10	28.89	43.50	-14.61	QP
H	183.8440	21.22	9.76	30.98	43.50	-12.52	QP
H	480.5276	11.50	19.51	31.01	46.00	-14.99	QP
H	962.1623	14.05	28.40	42.45	54.00	-11.55	QP

Remark:

Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit



Note: The test report records only the worst-case test values.

3.2.8 TEST RESULTS (1GHZ-18GHZ)

EUT :	VR All-in-one-Headset	Model Name. :	Crystal
Temperature :	20 ℃	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.8V
Test Mode :	Mode 2/3/4/5(MIMO Mode)		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Cable loss (dB)	Antenna Factor dB/m	Preamp Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel (5955 MHz)-Above 1G)									
Vertical	7193	55.18	5.43	36.28	37.26	59.63	68.2	-8.57	Pk
Vertical	10177	52.30	6.07	38.05	35.3	61.12	68.2	-7.08	Pk
Vertical	11910	56.63	6.77	37.7	32.33	68.77	74	-5.23	Pk
Vertical	11910	37.02	6.77	37.7	32.33	49.16	54	-4.84	AV
Horizontal	7198	54.03	5.43	36.15	37.31	58.30	68.2	-9.90	Pk
Horizontal	10183	52.99	6.07	38.07	35.39	61.74	68.2	-6.46	Pk
Horizontal	11910	53.11	6.77	37.7	32.33	65.25	74	-8.75	Pk
Horizontal	11910	39.62	6.77	37.7	32.33	51.76	54	-2.24	AV
Middle Channel (6175 MHz)-Above 1G)									
Vertical	7186	56.47	5.43	36.46	37.19	61.17	68.2	-7.03	Pk
Vertical	10488	51.95	6.17	38.48	32.19	64.41	68.2	-3.79	Pk
Vertical	12350	54.02	6.92	38.6	30.88	68.66	74	-5.34	Pk
Vertical	12350	35.76	6.92	38.6	30.88	50.40	54	-3.60	AV
Horizontal	7183	52.73	5.43	36.54	37.16	57.54	68.2	-10.66	Pk
Horizontal	10482	50.67	6.17	38.46	32.2	63.10	68.2	-5.10	Pk
Horizontal	12350	53.88	6.92	38.6	30.88	68.52	74	-5.48	Pk
Horizontal	12350	36.32	6.92	38.6	30.88	50.96	54	-3.04	AV

High Channel (6415 MHz)-Above 1G)									
Vertical	7293	48.57	5.45	36.43	35.09	55.36	74	-18.64	Pk
Vertical	7292	35.14	5.45	36.42	35.12	41.89	54	-12.11	AV
Vertical	12830	46.24	7.06	40.25	28.91	64.64	68.2	-3.56	Pk
Vertical	15791	50.21	7.66	38.62	32.88	63.61	74	-10.39	Pk
Vertical	15791	33.89	7.66	38.62	32.88	47.29	54	-6.71	AV
Horizontal	7286	53.29	5.45	36.36	35.26	59.84	74	-14.16	Pk
Horizontal	7285	38.84	5.45	36.35	35.29	45.35	54	-8.65	AV
Horizontal	12830	47.29	7.06	40.25	28.91	65.69	68.2	-2.51	Pk
Horizontal	15772	51.27	7.66	38.66	32.7	64.89	74	-9.11	Pk
Horizontal	15770	36.32	7.66	38.66	32.68	49.96	54	-4.04	AV

Note:"802.11ax20 MIMO" mode is the worst mode.

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

All modes have been test, just the 802.11ax20 MIMO worst mode has been recorded in the report.

See Annex 5.7 for test data at the antenna port

Polar	Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector Type
(H/V)	(MHz)	(dBuV)	(dB)	dB/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (6435 MHz)-Above 1G)									
Vertical	7173	50.07	5.42	36.8	37.06	55.23	68.2	-12.97	Pk
Vertical	12870	46.79	7.07	40.05	28.89	65.02	68.2	-3.18	Pk
Vertical	15555	50.28	7.62	38.6	30.56	65.94	74	-8.06	Pk
Vertical	15558	34.50	7.62	38.56	30.59	50.09	54	-3.91	AV
Horizontal	7178	46.89	5.42	36.67	37.11	51.87	68.2	-16.33	Pk
Horizontal	12870	46.68	7.07	40.05	28.89	64.91	68.2	-3.29	Pk
Horizontal	15564	49.60	7.63	38.5	30.67	65.06	74	-8.94	Pk
Horizontal	15564	35.50	7.63	38.5	30.67	50.96	54	-3.04	AV
Middle Channel (6475 MHz)-Above 1G)									
Vertical	7188	49.38	5.43	36.41	37.21	54.01	68.2	-14.19	Pk
Vertical	12950	47.30	7.1	39.65	28.85	65.20	68.2	-3.00	Pk
Vertical	15673	50.61	7.64	38.61	31.79	65.07	74	-8.93	Pk
Vertical	15674	35.65	7.64	38.62	31.8	50.11	54	-3.89	AV
Horizontal	7183	51.69	5.43	36.54	37.16	56.50	68.2	-11.70	Pk
Horizontal	12950	46.47	7.1	39.65	28.85	64.37	68.2	-3.83	Pk
Horizontal	15670	52.59	7.64	38.59	31.76	67.06	74	-6.94	Pk
Horizontal	15670	36.39	7.64	38.59	31.76	50.86	54	-3.14	AV

High Channel (6515 MHz)-Above 1G)									
Vertical	7529	51.03	5.51	36.79	34.16	59.17	74	-14.83	Pk
Vertical	7529	35.99	5.51	36.79	34.16	44.13	54	-9.87	AV
Vertical	13030	47.84	7.12	39.58	29.06	65.48	68.2	-2.72	Pk
Vertical	17872	47.82	8.17	44.52	28.66	71.85	74	-2.15	Pk
Vertical	17872	25.98	8.17	44.52	28.66	50.01	54	-3.99	AV
Horizontal	7528	49.74	5.51	36.78	34.15	57.88	74	-16.12	Pk
Horizontal	7528	35.44	5.51	36.78	34.15	43.58	54	-10.42	AV
Horizontal	13030	46.69	7.12	39.58	29.06	64.33	68.2	-3.87	Pk
Horizontal	17870	46.49	8.17	44.5	28.63	70.53	74	-3.47	Pk
Horizontal	17870	26.86	8.17	44.5	28.63	50.90	54	-3.10	AV

Note:"802.11ax20 MIMO" mode is the worst mode.

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

All modes have been test, just the 802.11ax20 MIMO worst mode has been recorded in the report.

See Annex 5.7 for test data at the antenna port

Polar	Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector Type
(H/V)	(MHz)	(dBuV)	(dB)	dB/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (6535 MHz)-Above 1G)									
Vertical	7209	49.14	5.43	36.08	37.11	53.54	68.2	-14.66	Pk
Vertical	13070	47.06	7.12	39.82	29.38	64.62	68.2	-3.58	Pk
Vertical	16073	53.66	7.72	38.82	29.35	70.85	74	-3.15	Pk
Vertical	16074	33.72	7.72	38.84	29.37	50.91	54	-3.09	AV
Horizontal	7201	50.91	5.43	36.1	37.31	55.13	68.2	-13.07	Pk
Horizontal	13070	47.28	7.12	39.82	29.38	64.84	68.2	-3.36	Pk
Horizontal	16071	49.13	7.72	38.79	29.3	66.34	74	-7.66	Pk
Horizontal	16074	33.08	7.72	38.84	29.37	50.27	54	-3.73	AV
Middle Channel (6695 MHz)-Above 1G)									
Vertical	7211	51.65	5.43	36.08	37.07	56.09	68.2	-12.11	Pk
Vertical	10013	52.74	6.01	37.38	32.89	63.24	68.2	-4.96	Pk
Vertical	13390	50.38	7.19	40.76	30.03	68.30	74	-5.70	Pk
Vertical	13390	32.35	7.19	40.76	30.03	50.27	54	-3.73	AV
Horizontal	7206	51.90	5.43	36.09	37.19	56.23	68.2	-11.97	Pk
Horizontal	10014	50.90	6.01	37.38	32.91	61.38	68.2	-6.82	Pk
Horizontal	13390	51.30	7.19	40.76	30.03	69.22	74	-4.78	Pk
Horizontal	13390	32.43	7.19	40.76	30.03	50.35	54	-3.65	AV

High Channel (6855 MHz)-Above 1G)									
Vertical	7592	50.05	5.53	36.66	34.97	57.27	74	-16.73	Pk
Vertical	7596	38.52	5.53	36.63	35.02	45.66	54	-8.34	AV
Vertical	13710	47.01	7.25	40.56	29.66	65.16	68.2	-3.04	Pk
Vertical	15673	50.99	7.64	38.61	31.79	65.45	74	-8.55	Pk
Vertical	15674	36.18	7.64	38.62	31.8	50.64	54	-3.36	AV
Horizontal	7595	50.99	5.53	36.64	35.01	58.15	74	-15.85	Pk
Horizontal	7592	36.09	5.53	36.66	34.97	43.31	54	-10.69	AV
Horizontal	13710	46.64	7.25	40.56	29.66	64.79	68.2	-3.41	Pk
Horizontal	15674	50.20	7.64	38.62	31.8	64.66	74	-9.34	Pk
Horizontal	15672	35.21	7.64	38.6	31.78	49.67	54	-4.33	AV

Note:"802.11ax20 MIMO" mode is the worst mode.

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

All modes have been test, just the 802.11ax20 MIMO worst mode has been recorded in the report.

See Annex 5.7 for test data at the antenna port

Polar	Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector Type
(H/V)	(MHz)	(dBuV)	(dB)	dB/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (6895 MHz)-Above 1G)									
Vertical	7205	50.12	5.43	36.09	37.21	54.43	68.2	-13.77	Pk
Vertical	13790	47.68	7.27	41.04	30.91	65.08	68.2	-3.12	Pk
Vertical	16084	49.35	7.73	38.98	29.59	66.47	74	-7.53	Pk
Vertical	16080	33.77	7.73	38.92	29.5	50.92	54	-3.08	AV
Horizontal	7208	52.78	5.43	36.08	37.14	57.15	68.2	-11.05	Pk
Horizontal	13790	48.59	7.27	41.04	30.91	65.99	68.2	-2.21	Pk
Horizontal	16081	49.15	7.73	38.93	29.52	66.29	74	-7.71	Pk
Horizontal	16084	32.75	7.73	38.98	29.59	49.87	54	-4.13	AV
Middle Channel (6995 MHz)-Above 1G)									
Vertical	7216	51.39	5.43	36.07	36.95	55.94	68.2	-12.26	Pk
Vertical	13990	46.99	7.31	40.75	29.2	65.85	68.2	-2.35	Pk
Vertical	15863	47.11	7.68	37.84	31.32	61.31	74	-12.69	Pk
Vertical	15861	34.92	7.68	37.87	31.37	49.10	54	-4.90	AV
Horizontal	7213	50.99	5.43	36.07	37.02	55.47	68.2	-12.73	Pk
Horizontal	13990	46.52	7.31	40.75	29.2	65.38	68.2	-2.82	Pk
Horizontal	15860	48.06	7.68	37.88	31.4	62.22	74	-11.78	Pk
Horizontal	15861	32.77	7.68	37.87	31.37	46.95	54	-7.05	AV

High Channel (7095 MHz)-Above 1G)									
Vertical	7462	49.94	5.5	36.8	33.31	58.93	74	-15.07	Pk
Vertical	7466	34.37	5.5	36.77	33.36	43.28	54	-10.72	AV
Vertical	14190	45.81	7.35	40.19	27.82	65.53	68.2	-2.67	Pk
Vertical	15647	50.83	7.64	38.43	31.55	65.35	74	-8.65	Pk
Vertical	15642	34.26	7.64	38.39	31.51	48.78	54	-5.22	AV
Horizontal	7468	52.95	5.5	36.76	33.39	61.82	74	-12.18	Pk
Horizontal	7465	35.52	5.5	36.78	33.35	44.45	54	-9.55	AV
Horizontal	14190	45.71	7.35	40.19	27.82	65.43	68.2	-2.77	Pk
Horizontal	15647	48.45	7.64	38.43	31.55	62.97	74	-11.03	Pk
Horizontal	15640	33.12	7.64	38.38	31.49	47.65	54	-6.35	AV

Note:"802.11ax20 MIMO" mode is the worst mode.

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

All modes have been test, just the 802.11ax20 MIMO worst mode has been recorded in the report.

See Annex 5.7 for test data at the antenna port

3.2.9 TEST RESULTS (18GHZ-40GHZ)

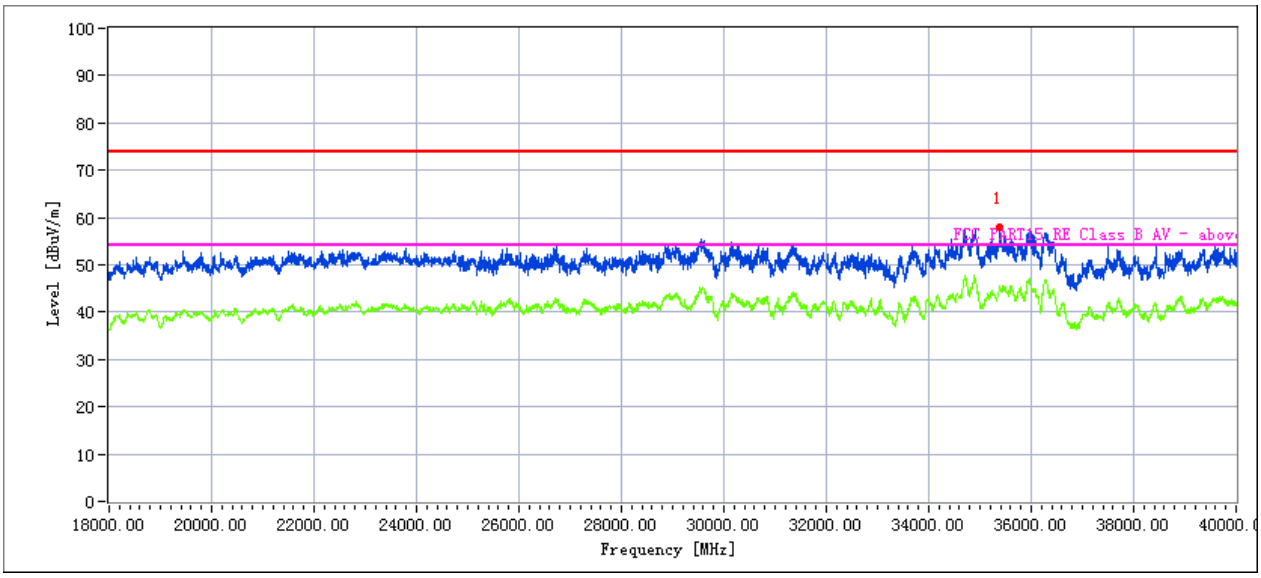
EUT :	VR All-in-one-Headset	Model Name. :	Crystal
Temperature :	20 ℃	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.8V
Test Mode :	Mode 2/3/4/5(MIMO Mode)		

Note: The test report records only the worst-case test values.

802.11ax40 MIMO mode CH3

Horizontal

Measurement Plot:

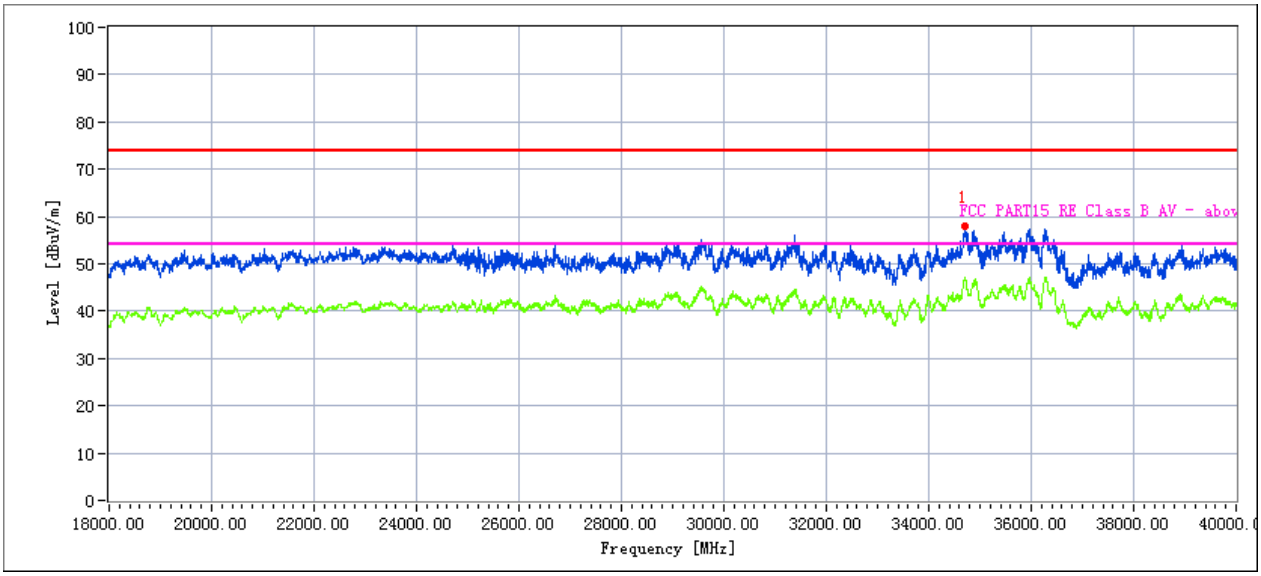


Measurement Result:

Frequency MHz	Meter Reading dBuV	Cable loss dB	Antenna Factor dB/m	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Detector Type
35382.435	38.69	20.09	44.16	43.48	59.46	68.20	8.74	Peak

Vertical

Measurement Plot:



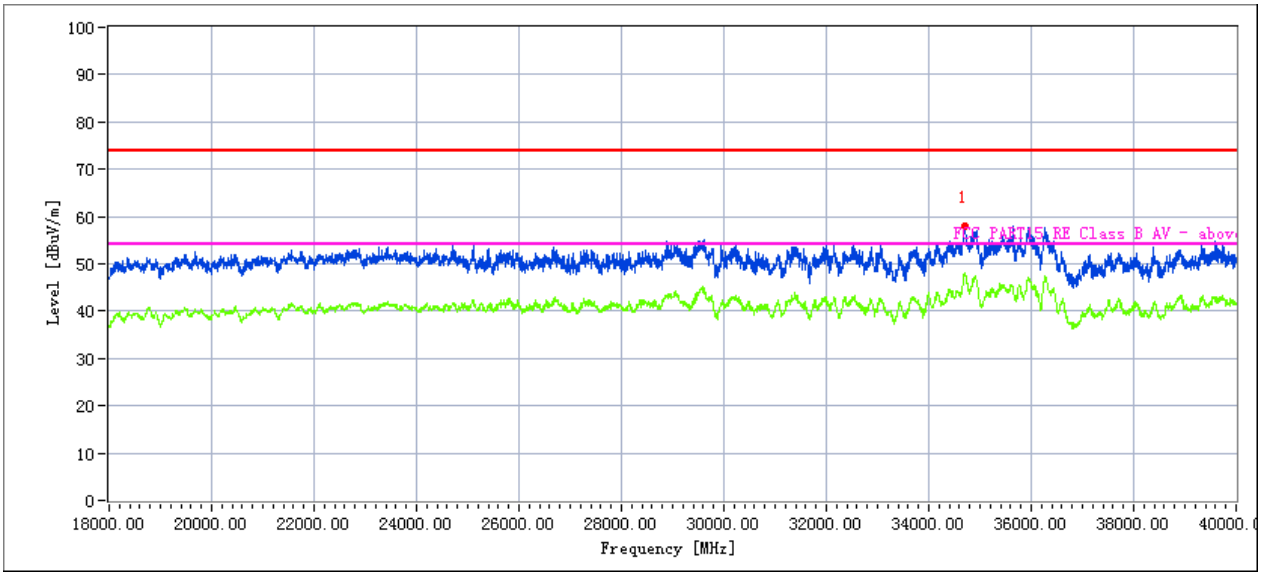
Measurement Result:

Frequency MHz	Meter Reading dBuV	Cable loss dB	Antenna Factor dB/m	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Detector Type
34716.766	41.51	19.11	42.63	43.48	59.77	68.20	8.43	Peak

802.11ax20 MIMO mode CH97

Horizontal

Measurement Plot:

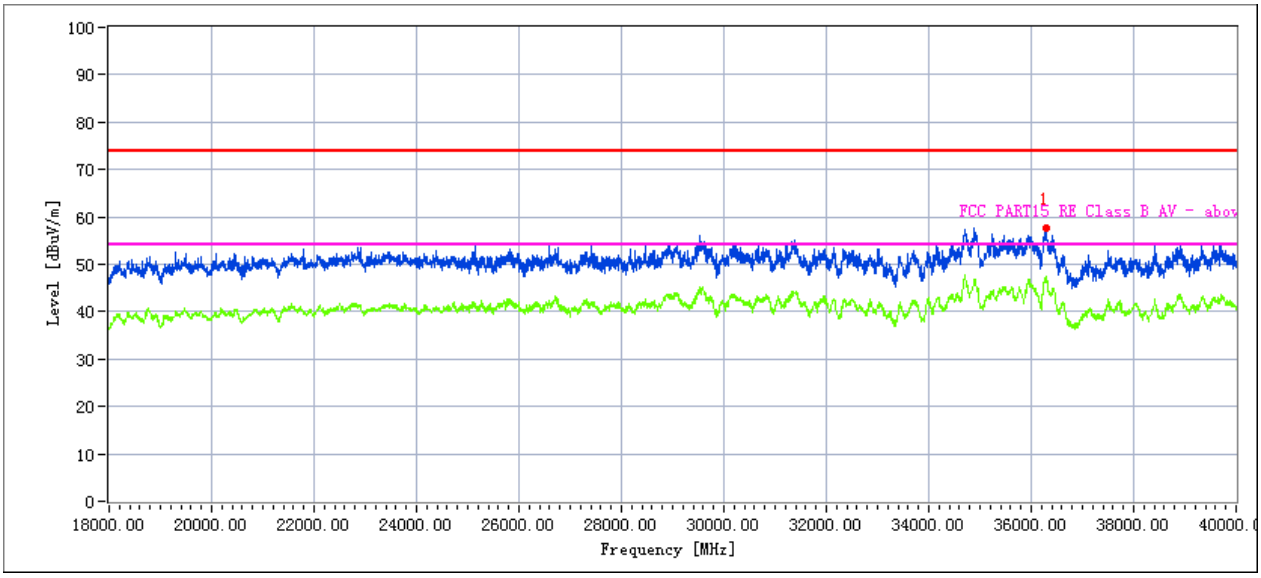


Measurement Result:

Frequency MHz	Meter Reading dBuV	Cable loss dB	Antenna Factor dB/m	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Detector Type
34702.440	38.04	20.06	44.07	43.21	58.96	68.20	9.24	Peak

Vertical

Measurement Plot:



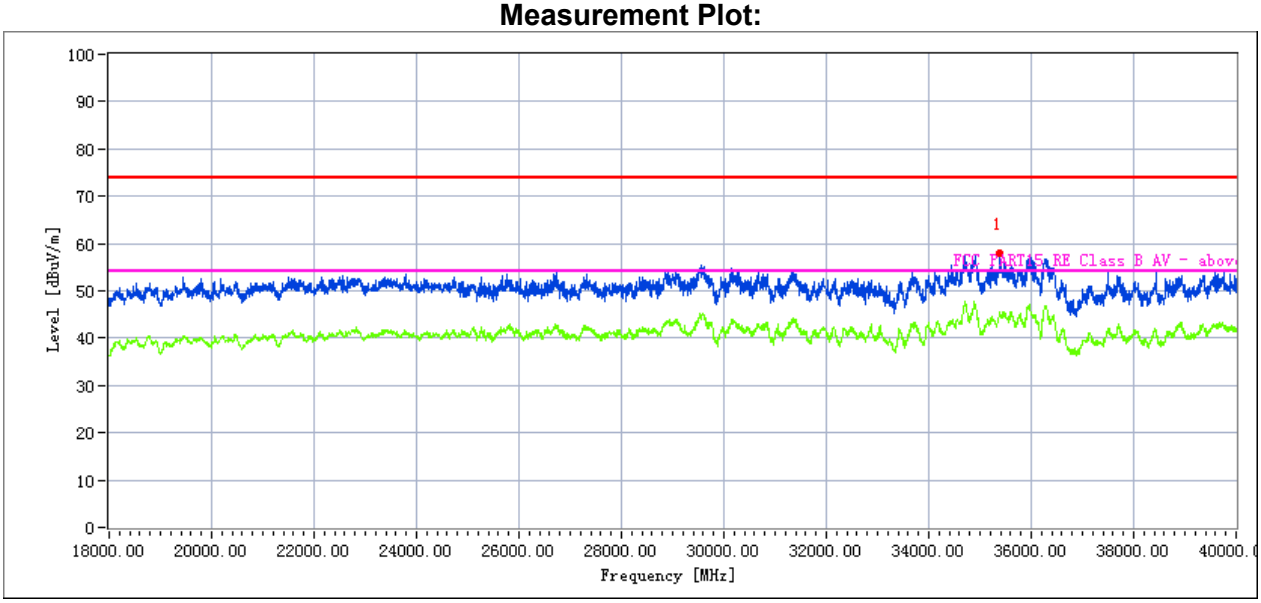
Measurement Result:

Frequency MHz	Meter Reading dBuV	Cable loss dB	Antenna Factor dB/m	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Detector Type
36277.393	37.98	20.10	44.10	43.22	58.96	68.20	9.24	Peak

802.11ax20 MIMO mode CH149

Horizontal

Measurement Plot:

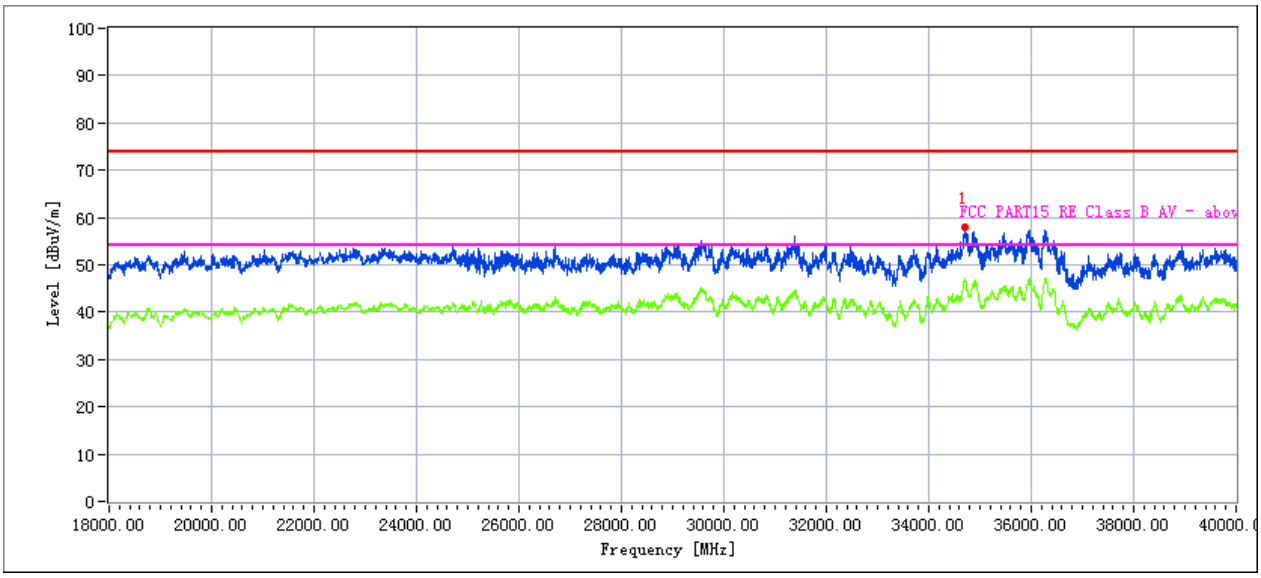


Measurement Result:

Frequency MHz	Meter Reading dBuV	Cable loss dB	Antenna Factor dB/m	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Detector Type
35382.295	38.98	20.09	44.16	43.48	59.75	68.20	8.45	Peak

Vertical

Measurement Plot:



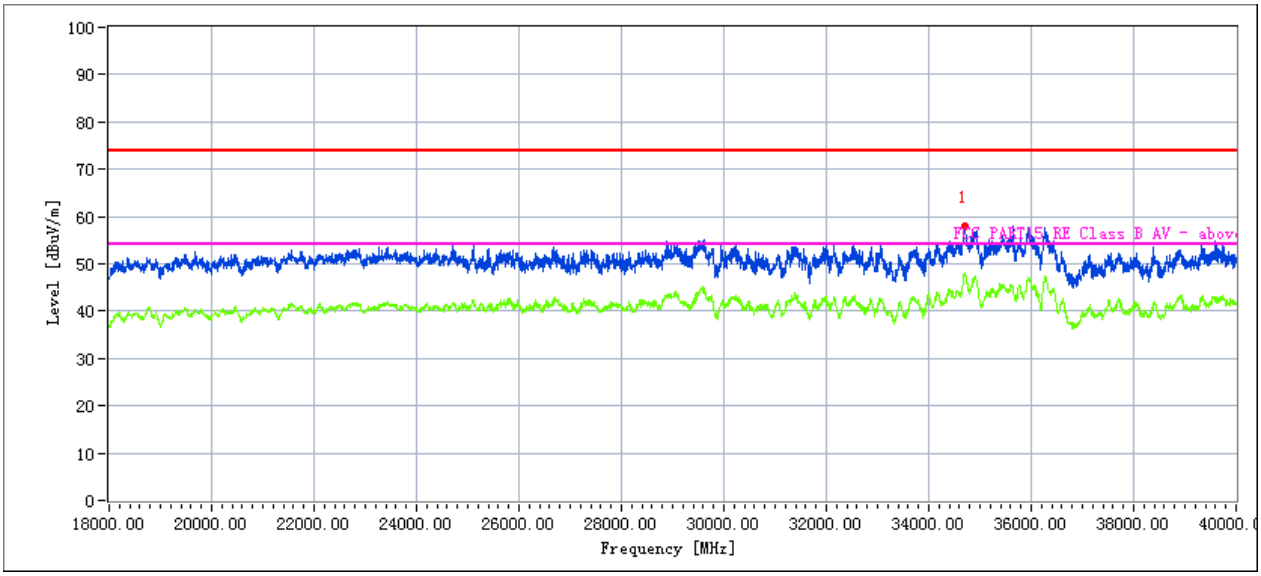
Measurement Result:

Frequency MHz	Meter Reading dBuV	Cable loss dB	Antenna Factor dB/m	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Detector Type
34716.945	41.19	19.11	42.63	43.48	59.45	68.20	8.75	Peak

802.11ax20 MIMO mode CH209

Horizontal

Measurement Plot:

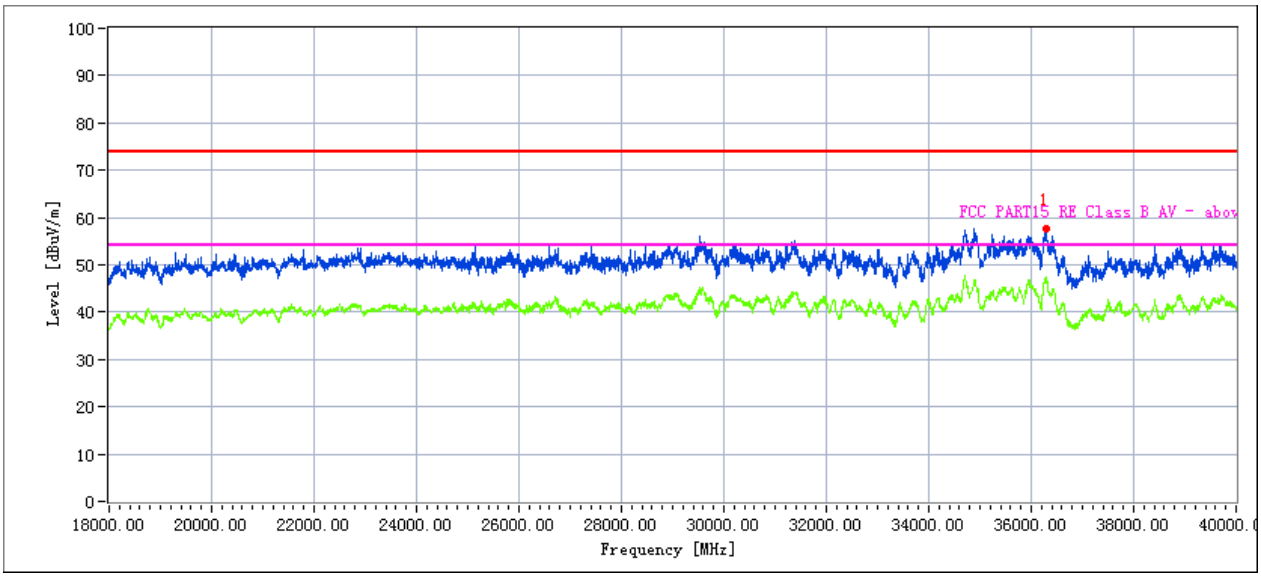


Measurement Result:

Frequency MHz	Meter Reading dBuV	Cable loss dB	Antenna Factor dB/m	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Detector Type
34702.461	38.48	20.06	44.07	43.21	59.40	68.20	8.80	Peak

Vertical

Measurement Plot:



Measurement Result:

Frequency MHz	Meter Reading dBuV	Cable loss dB	Antenna Factor dB/m	Preamp Factor dB	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Detector Type
36277.482	38.65	20.10	44.10	43.22	59.63	68.20	8.57	Peak

3.2.10 SPURIOUS EMISSION IN BANDEDGE

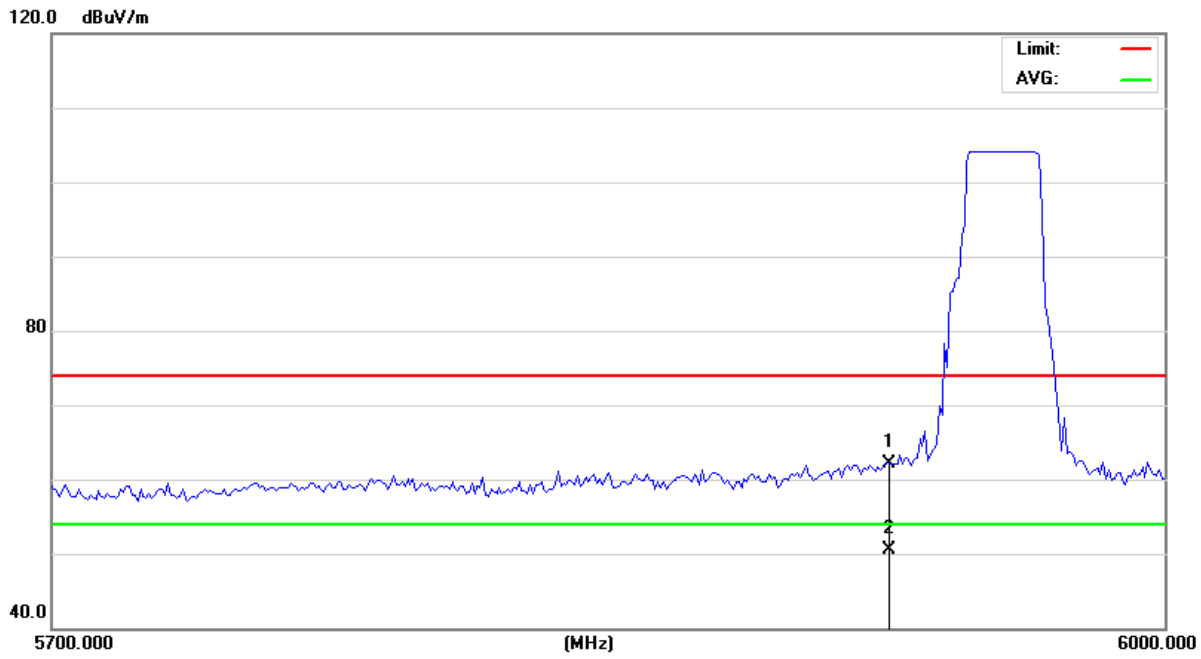
EUT :	VR All-in-one-Headset	Model Name. :	Crystal
Temperature :	20 ℃	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.8V
Test Mode :	Mode 2/3/4/5(MIMO Mode)		

802.11ax20 MIMO Mode 5955MHz

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
V	5925.000	42.78	19.31	62.09	74.00	-11.91	peak
V	5925.000	31.19	19.31	50.50	54.00	-3.50	AVG

Remark:

Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit

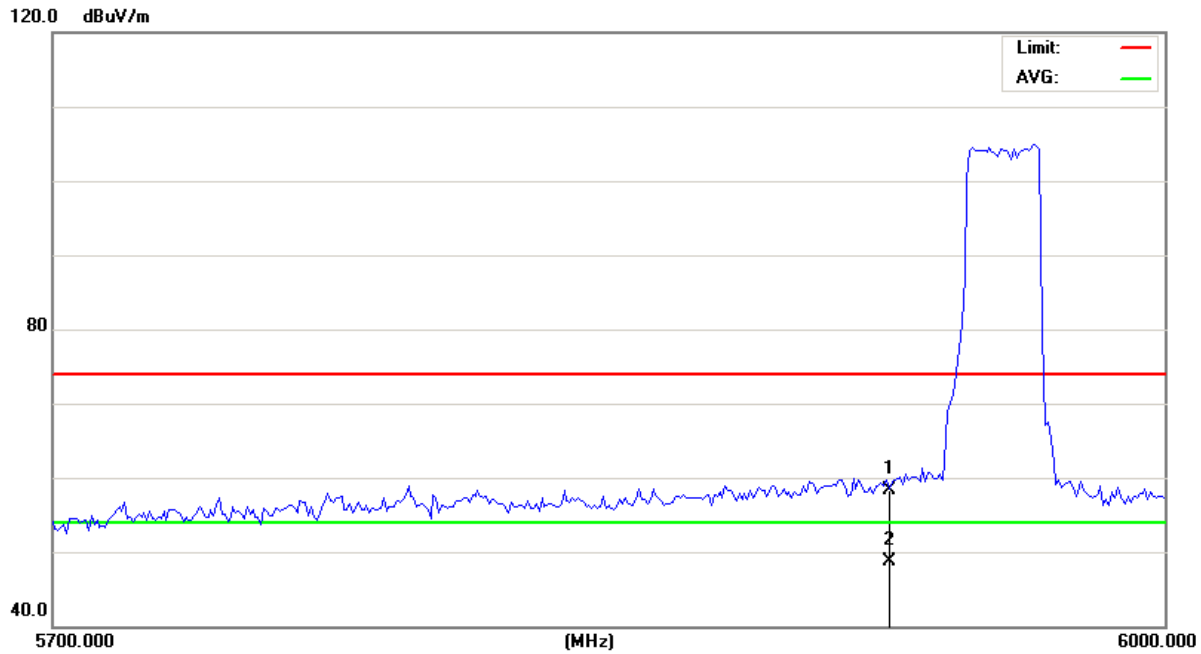


Note: The test report records only the worst-case test values.
See Annex 5.7 for test data at the antenna port

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
H	5925.000	39.09	19.31	58.40	74.00	-15.60	peak
H	5925.000	29.33	19.31	48.64	54.00	-5.36	AVG

Remark:

Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit



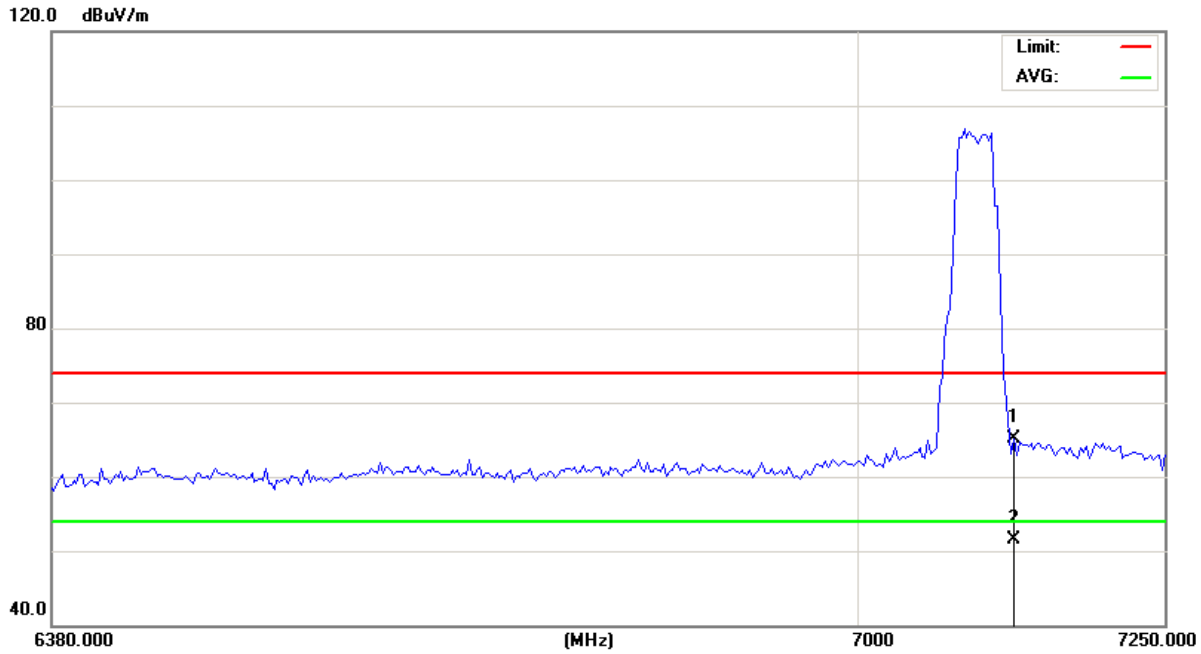
Note: The test report records only the worst-case test values.
See Annex 5.7 for test data at the antenna port

802.11ax20 MIMO Mode 7095MHz

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
V	7125.000	42.63	22.50	65.13	74.00	-8.87	peak
V	7125.000	28.97	22.50	51.47	54.00	-2.53	AVG

Remark:

Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit

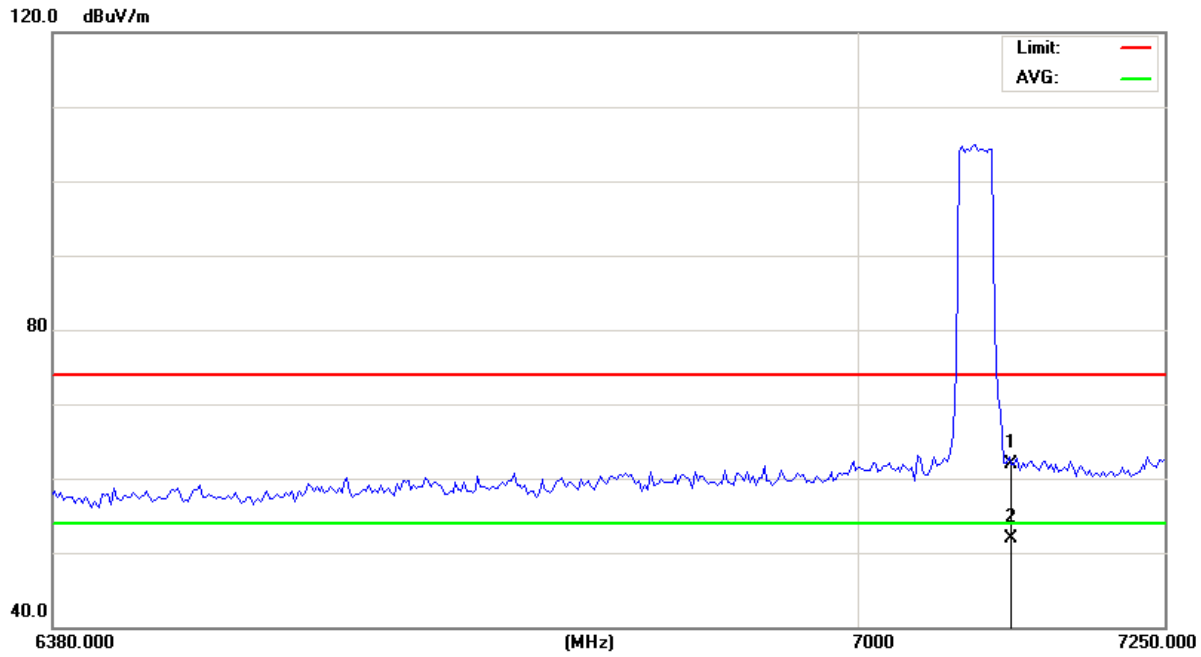


Note: The test report records only the worst-case test values.
See Annex 5.7 for test data at the antenna port

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
H	7125.000	39.41	22.50	61.91	74.00	-12.09	peak
H	7125.000	29.37	22.50	51.87	54.00	-2.13	AVG

Remark:

Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit



Note: The test report records only the worst-case test values.
See Annex 5.7 for test data at the antenna port

3.3 EIRP POWER SPECTRAL DENSITY TEST

3.3.1 APPLIED PROCEDURES / LIMIT

According to FCC §15.407(a)(8)

For client devices operating under the control of an indoor access point in the 5.925–7.125 GHz bands, the maximum power spectral density must not exceed −1 dBm e.i.r.p. in any 1-megahertz band, and the maximum e.i.r.p. over the frequency band of operation must not exceed 24 dBm.

3.3.2 TEST PROCEDURE

For devices operating in the bands 5.925–7.125 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(8).

The following test procedures apply:

1. Set span to encompass the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
2. Set RBW = 1MHz
3. Set VBW ≥ 3 RBW.
4. Number of points in sweep ≥ 2 × span / RBW.
5. Sweep time = auto.
6. Detector = power averaging (rms)
7. Trace average at least 100 traces in power averaging (rms) mode;
8. Add 10 log (1/x), where x is the duty cycle

3.3.3 DEVIATION FROM STANDARD

No deviation.

3.3.4 TEST SETUP

Refer to section 3.2.4 of this report.

3.3.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

3.3.6 TEST RESULTS

EUT :	VR All-in-one-Headset	Model Name. :	Crystal
Temperature :	25 ℃	Relative Humidity :	56%
Pressure :	1015 hPa	Test Voltage :	DC 3.8V
Test Mode :	Mode 2/3/4/5(MIMO Mode)		

Test data reference attachment 5.6.

3.4 26DB & 99% EMISSION BANDWIDTH

3.4.1 APPLIED PROCEDURES / LIMIT

According to FCC §15.407(a)(10)

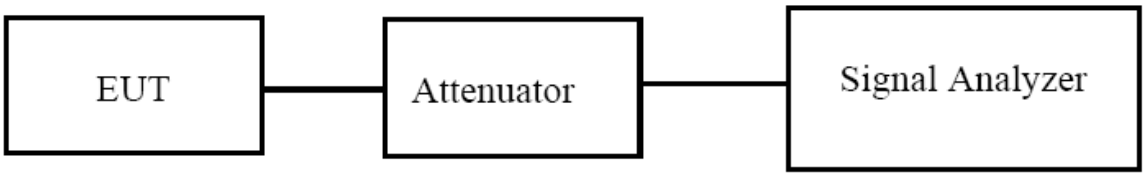
The maximum transmitter channel bandwidth for U-NII devices in the 5.925-7.125 GHz band is 320 megahertz.

3.4.2 TEST PROCEDURE

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 maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

The following procedure shall be used for measuring (99 %) power bandwidth:

1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW ≥ 3 · RBW
5. 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.
6. Use the 99 % power bandwidth function of the instrument (if available).



3.4.3 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

3.4.4 TEST RESULTS

EUT :	VR All-in-one-Headset	Model Name. :	Crystal
Temperature :	25 ℃	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	DC 3.8V
Test Mode :	Mode 2/3/4/5(MIMO Mode)		

Test data reference attachment 5.2.

3.5 IN-BAND EMISSIONS

3.5.1 APPLIED PROCEDURES / LIMIT

According to FCC §15.407(b)(7)
For transmitters operating within the 5.925-7.125 GHz bands: Power spectral density must be suppressed by 20 dB at 1 MHz outside of channel edge, by 28 dB at one channel bandwidth from the channel center, and by 40 dB at one- and one-half times the channel bandwidth away from channel center. At frequencies between one megahertz outside an unlicensed device's channel edge and one channel bandwidth from the center of the channel, the limits must be linearly interpolated between 20 dB and 28 dB suppression, and at frequencies between one and one- and one-half times an unlicensed device's channel bandwidth, the limits must be linearly interpolated between 28 dB and 40 dB suppression. Emissions removed from the channel center by more than one- and one-half times the channel bandwidth must be suppressed by at least 40 dB.

3.5.2 TEST PROCEDURE

a) Set the span to encompass the entire 26 dB EBW of the signal.

b) Set RBW = same RBW used for 26 dB EBW measurement.

c) Set VBW ≥ 3 X RBW

d) Number of points in sweep ≥ [2 X span / RBW]

e) Detector = RMS (i.e., power averaging).

f) Trace mode = max hold.

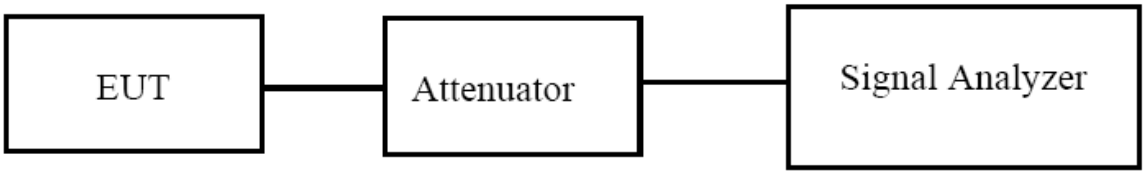
g) Sweep = auto couple.

h) Trace average at least 100 traces in power averaging (rms) mode.

3.5.3 DEVIATION FROM STANDARD

No deviation.

3.5.4 TEST SETUP



3.5.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

3.5.6 **TEST RESULTS**

EUT :	VR All-in-one-Headset	Model Name. :	Crystal
Temperature :	25 ℃	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 3.8V
Test Mode :	Mode 2/3/4/5(MIMO Mode)		

Test data reference attachment 5.9.

3.6 MAXIMUM EIRP OUTPUT POWER

3.6.1 PPLIED PROCEDURES / LIMIT

According to FCC §15.407(a)(8)

For client devices operating under the control of an indoor access point in the 5.925–7.125 GHz bands, the maximum power spectral density must not exceed −1 dBm e.i.r.p. in any 1-megahertz band, and the maximum e.i.r.p. over the frequency band of operation must not exceed 24 dBm.

3.6.2 TEST PROCEDURE

For devices operating in the bands 5.925–7.125 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(4)(8). The following test procedures apply:

1. Set span to encompass the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
2. Set RBW = 1MHz
3. Set VBW ≥ 3 RBW.
4. Number of points in sweep ≥ 2 × span / RBW.
5. Sweep time = auto.
6. Detector = power averaging (rms)
7. Trace average at least 100 traces in power averaging (rms) mode;
8. Add 10 log (1/x), where x is the duty cycle

3.6.3 DEVIATION FROM STANDARD

No deviation.

3.6.4 TEST SETUP

Refer to section 3.2.4 of this report.

3.6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

3.6.6 TEST RESULTS

EUT：	VR All-in-one-Headset	Model Name. ：	Crystal
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 3.8V
Test Mode ：	Mode 2/3/4/5(MIMO Mode)		

Test data reference attachment 5.4.

3.7 OPERATIONAL RESTRICTIONS FOR 6 GHZ U-NII DEVICES.

3.7.1 APPLICABLE STANDARD

According to FCC §15.407(d)(2)(3)(5)(6)

Operation of transmitters in the 5.925–7.125 GHz band is prohibited for control of or communications with unmanned aircraft systems.

Transmitters operating under the provisions of paragraphs (a)(5), (a)(6), and (a)(8) of this section are limited to indoor locations.

In the 5.925–7.125 GHz band, client devices, except fixed client devices, must operate under the control of a standard power access point, indoor access point or subordinate devices; Subordinate devices must operate under the control of an indoor access point. In all cases, an exception exists for transmitting brief messages to an access point when attempting to join its network after detecting a signal that confirms that an access point is operating on a particular channel. Access points and subordinate devices may connect to other access points or subordinate devices. Client devices are prohibited from connecting directly to another client device.

Indoor access points, subordinate devices and client devices operating in the 5.925–7.125 GHz band must employ a contention-based protocol.

3.7.2 **TEST RESULTS**

EUT :	VR All-in-one-Headset	Model Name. :	Crystal
Temperature :	25 ℃	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	DC 3.8V

Declaration by applicant all restrictions are meet the FCC §15.407(d)(2)(3)(5)(6) requirements.

3.8 CONTENTION BASED PROTOCOL

3.8.1 LIMIT OF CONTENTION BASED PROTOCOL

According to FCC §15.407(d)(6)

Indoor access points, subordinate devices and client devices operating in the 5.925-7.125 GHz band must employ a contention-based protocol.

FCC KDB 987594 D02 U-NII 6GHz EMC Measurement v01r01

Unlicensed low-power indoor devices must detect co-channel radio frequency power that is at least -62 dBm or lower. Upon detection of energy in the band, unlicensed low power indoor devices must vacate the channel and stay off the channel as long as detected radio frequency power is equal to or greater than the threshold (-62 dBm). The -62 dBm (or lower) threshold is referenced to a 0 dBi antenna gain. To ensure incumbent operations are reliably detected in the band, low power indoor devices must detect RF energy throughout their intended operating channel. For example, an 802.11 device that plans to transmit a 40 MHz- wide signal (on a primary 20 MHz channel and a secondary 20 MHz channel) must detect energy throughout the entire 40 MHz channel. Additionally, low-power indoor devices must detect co-channel energy with 90% or greater certainty.

Table 1. Criteria to determine number of times detection threshold test may be performed

If	Number of Tests	Placement of Incumbent Transmission
$BW_{EUT} \leq BW_{Inc}$	Once	Tune incumbent and EUT transmissions ($f_{c1} = f_{c2}$)
$BW_{Inc} < BW_{EUT} \leq 2BW_{Inc}$	Once	Incumbent transmission is contained within BW_{EUT}
$2BW_{Inc} < BW_{EUT} \leq 4BW_{Inc}$	Twice. Incumbent transmission is contained within BW_{EUT}	Incumbent transmission is located as closely as possible to the lower edge and upper edge, respectively, of the EUT channel
$BW_{EUT} > 4BW_{Inc}$	Three times	Incumbent transmission is located as closely as possible to the lower edge of the EUT channel, in the middle of EUT channel, and as closely as possible to the upper edge of the EUT channel

where:

BW_{EUT}: Transmission bandwidth of EUT signal
BW_{Inc}: Transmission bandwidth of the simulated incumbent signal (10 MHz wide AWGN signal)
f_{c1}: Center frequency of EUT transmission
f_{c2}: Center frequency of simulated incumbent signal

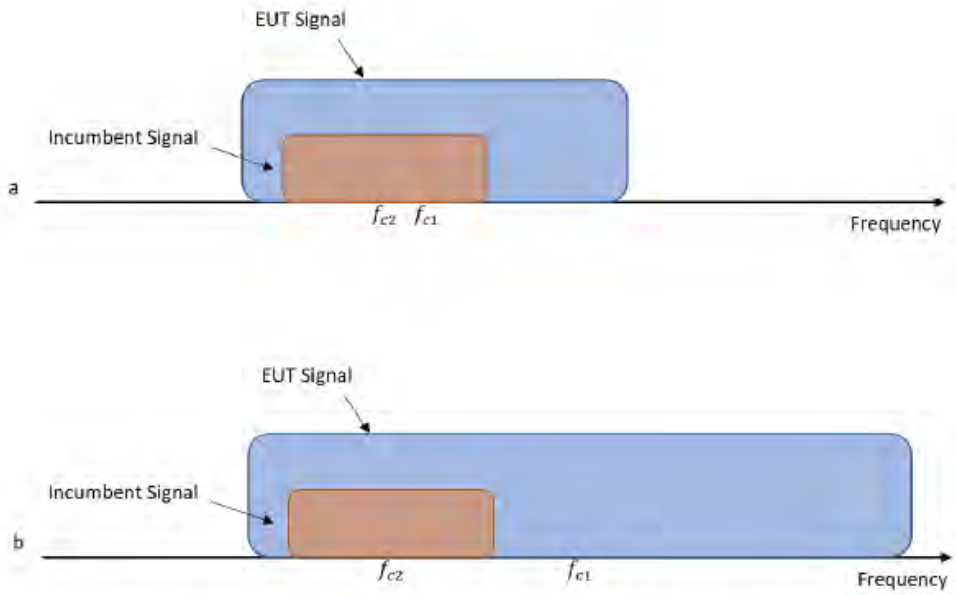


Figure 1. Two possible scenarios where a) center frequency of EUT transmission falls within incumbent's bandwidth, or b) outside of it

3.8.2TEST PROCEDURES

The testing follows FCC KDB 987594 D02 U-NII 6GHz EMC Measurement v01r01.
Section I) Contention Based Protocol
Conducted method Step-by-Step Procedure, Conducted Setup
1. Configure the EUT to transmit with a constant duty cycle.
2. Set the operating parameters of the EUT including power level, operating frequency, modulation and bandwidth.
3. Set the signal analyzer center frequency to the nominal EUT channel center frequency. The span range of the signal analyzer shall be between two times and five times the OBW of the EUT.
4. Connect the output port of the EUT to the signal analyzer 2, as shown in test setup Figure 2. Ensure that the attenuator 2 provides enough attenuation to not overload the signal analyzer 2 receiver.
5. Monitoring the signal analyzer 2, verify the EUT is operating and transmitting with the parameters set at step two.
6. Using an AWGN signal source, generate (but do not transmit, i.e., RF OFF) a 10 MHz-wide AWGN signal. Use Table 1 to determine the center frequency of the 10 MHz AWGN signal relative to the EUT's channel bandwidth and center frequency.
7. Set the AWGN signal power to an extremely low level (more than 20 dB below the -62 dBm threshold). Connect the AWGN signal source, via a 3-dB splitter, to the signal analyzer 1 and the EUT as shown in test setup Figure 2.
8. Transmit the AWGN signal (RF ON) and verify its characteristics on the signal analyzer 1.
9. Monitor the signal analyzer 2 to verify if the AWGN signal has been detected and the EUT has ceased transmission. If the EUT continues to transmit, then incrementally increase the AWGN signal power level until the EUT stops transmitting.
10. (Including all losses in the RF paths) Determine and record the AWGN signal power level (at the EUT's antenna port) at which the EUT ceased transmission. Repeat the procedure at least 10 times to verify the EUT can detect an AWGN signal with 90% (or better) level of certainty.
11. Refer to Table 1 to determine number of times the detection threshold testing needs to be repeated. If testing is required more than once, then go back to step 5, choose a different center frequency for the AWGN signal and repeat the process.
12. For the contention-based protocol test where only one channel in each supported sub-band needs to be tested. The narrowest and widest bandwidth in each channel shall be measured EUT was driven in MIMO mode, the interferer level was injected to both chains to monitor the performance, while the interferer level is determined according the lowest antenna gain among both antennas (i.e, lower interferer level)

3.8.3TEST SETUP

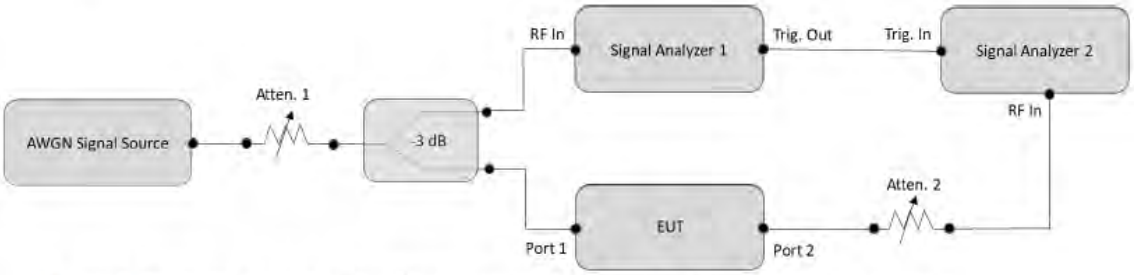


Figure 2. Contention-based protocol test setup, conducted method Step-by-Step Procedure, Conducted Setup

3.8.4TEST RESULTS

Test data reference attachment 5.10.

3.9 FREQUENCY STABILITY

Section 15.407(g) specifies that U-NII devices are required to ensure frequency stability. It is required that that the emissions are maintained within the band of operation under all conditions of normal operation as specified in the user's manual. The grantee is responsible for ensuring that the EUT meets Section 15.407(g) requirements; however, the applications for equipment certification are not required to include test reports with explicit demonstration of compliance.

Test data reference attachment 5.8.

4. ANTENNA REQUIREMENT

4.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

4.2 EUT ANTENNA

The EUT have a permanent attached FPC antenna. It comply with the standard requirement.

5. ATTACHMENT FOR TEST RESULT

5.1. DUTY CYCLE

Test Result

Ant1								
ENV	Mode	Frequency (MHz)	RU	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
NTNV	802.11ax (HEW20)	5955	SU	5.446	5.462	99.71	0.01	0.04
		6175	SU	5.446	5.462	99.71	0.01	0.00
		6415	SU	5.447	5.463	99.71	0.01	0.03
	802.11ax (HEW40)	5965	SU	5.444	5.460	99.71	0.01	0.04
		6165	SU	5.445	5.462	99.69	0.01	0.03
		6405	SU	5.445	5.462	99.69	0.01	0.03
	802.11ax (HEW80)	5985	SU	5.444	5.460	99.71	0.01	0.04
		6145	SU	5.444	5.460	99.71	0.01	0.04
		6385	SU	5.445	5.460	99.73	0.01	0.00
	802.11ax (HEW160)	6025	SU	5.444	5.460	99.71	0.01	0.04
		6185	SU	5.444	5.460	99.71	0.01	0.04
		6345	SU	5.444	5.460	99.71	0.01	0.04

Ant2								
ENV	Mode	Frequency (MHz)	RU	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
NTNV	802.11ax (HEW20)	5955	SU	5.446	5.462	99.71	0.01	0.00
		6175	SU	5.448	5.462	99.74	0.01	0.00
		6415	SU	5.444	5.462	99.67	0.01	0.04
	802.11ax (HEW40)	5965	SU	5.445	5.462	99.69	0.01	0.03
		6165	SU	5.445	5.460	99.73	0.01	0.00
		6405	SU	5.445	5.462	99.69	0.01	0.03
	802.11ax (HEW80)	5985	SU	5.412	5.460	99.12	0.04	0.04
		6145	SU	5.412	5.460	99.12	0.04	0.04
		6385	SU	5.412	5.460	99.12	0.04	0.04
	802.11ax (HEW160)	6025	SU	5.444	5.460	99.71	0.01	0.04
		6185	SU	5.444	5.460	99.71	0.01	0.04
		6345	SU	5.444	5.460	99.71	0.01	0.04

Ant1								
ENV	Mode	Frequency (MHz)	RU	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
NTNV	802.11ax	6435	SU	5.446	5.462	99.71	0.01	0.00

	(HEW20)	6475	SU	5.446	5.462	99.71	0.01	0.04
		6515	SU	5.447	5.462	99.73	0.01	0.00
	802.11ax (HEW40)	6445	SU	5.444	5.460	99.71	0.01	0.04
		6485	SU	5.446	5.462	99.71	0.01	0.04
	802.11ax (HEW80)	6465	SU	5.443	5.460	99.69	0.01	0.03

Ant2								
ENV	Mode	Frequency (MHz)	RU	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
NTNV	802.11ax (HEW20)	6435	SU	5.444	5.462	99.67	0.01	0.04
		6475	SU	5.444	5.462	99.67	0.01	0.04
		6515	SU	5.445	5.462	99.69	0.01	0.03
	802.11ax (HEW40)	6445	SU	5.445	5.462	99.69	0.01	0.03
		6485	SU	5.446	5.462	99.71	0.01	0.04
	802.11ax (HEW80)	6465	SU	5.412	5.460	99.12	0.04	0.04

Ant1								
ENV	Mode	Frequency (MHz)	RU	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
NTNV	802.11ax (HEW20)	6535	SU	5.445	5.461	99.71	0.01	0.03
		6695	SU	5.446	5.461	99.73	0.01	0.00
		6855	SU	5.446	5.462	99.71	0.01	0.00
	802.11ax (HEW40)	6565	SU	5.446	5.462	99.71	0.01	0.04
		6685	SU	5.446	5.462	99.71	0.01	0.04
		6845	SU	5.446	5.462	99.71	0.01	0.04
	802.11ax (HEW80)	6625	SU	5.444	5.460	99.71	0.01	0.04
		6705	SU	5.444	5.460	99.71	0.01	0.04
		6785	SU	5.444	5.460	99.71	0.01	0.04
	802.11ax (HEW160)	6665	SU	5.444	5.460	99.71	0.01	0.04

Ant2								
ENV	Mode	Frequency (MHz)	RU	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
NTNV	802.11ax (HEW20)	6535	SU	5.446	5.462	99.71	0.01	0.04
		6695	SU	5.446	5.462	99.71	0.01	0.00
		6855	SU	5.446	5.462	99.71	0.01	0.04
	802.11ax (HEW40)	6565	SU	5.444	5.460	99.71	0.01	0.04
		6685	SU	5.445	5.461	99.71	0.01	0.03
		6845	SU	5.446	5.462	99.71	0.01	0.04
	802.11ax (HEW80)	6625	SU	5.444	5.460	99.71	0.01	0.00
		6705	SU	5.412	5.460	99.12	0.04	0.04

		6785	SU	5.412	5.460	99.12	0.04	0.03
	802.11ax (HEW160)	6665	SU	5.445	5.460	99.73	0.01	0.00

Ant1								
ENV	Mode	Frequency (MHz)	RU	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
NTNV	802.11ax (HEW20)	6895	SU	5.446	5.462	99.71	0.01	0.00
		6995	SU	5.446	5.461	99.73	0.01	0.00
		7095	SU	5.446	5.462	99.71	0.01	0.00
	802.11ax (HEW40)	6925	SU	5.446	5.462	99.71	0.01	0.04
		7005	SU	5.446	5.462	99.71	0.01	0.04
		7085	SU	5.446	5.462	99.71	0.01	0.04
	802.11ax (HEW80)	6945	SU	5.412	5.460	99.12	0.04	0.04
		7025	SU	5.412	5.460	99.12	0.04	0.04
	802.11ax (HEW160)	6985	SU	5.445	5.460	99.73	0.01	0.00

Ant2								
ENV	Mode	Frequency (MHz)	RU	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
NTNV	802.11ax (HEW20)	6895	SU	5.446	5.462	99.71	0.01	0.04
		6995	SU	5.446	5.462	99.71	0.01	0.04
		7095	SU	5.446	5.462	99.71	0.01	0.04
	802.11ax (HEW40)	6925	SU	5.446	5.462	99.71	0.01	0.04
		7005	SU	5.445	5.462	99.69	0.01	0.03
		7085	SU	5.446	5.462	99.71	0.01	0.04
	802.11ax (HEW80)	6945	SU	5.412	5.460	99.12	0.04	0.04
		7025	SU	5.413	5.461	99.12	0.04	0.03
	802.11ax (HEW160)	6985	SU	5.444	5.460	99.71	0.01	0.04

Ant1								
ENV	Mode	Frequency (MHz)	RU	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
NTNV	802.11ax (HEW20)	6875	SU	5.447	5.462	99.73	0.01	0.00
	802.11ax (HEW40)	6885	SU	5.445	5.460	99.73	0.01	0.00
	802.11ax (HEW80)	6865	SU	5.444	5.460	99.71	0.01	0.04
	802.11ax (HEW160)	6825	SU	5.445	5.460	99.73	0.01	0.00

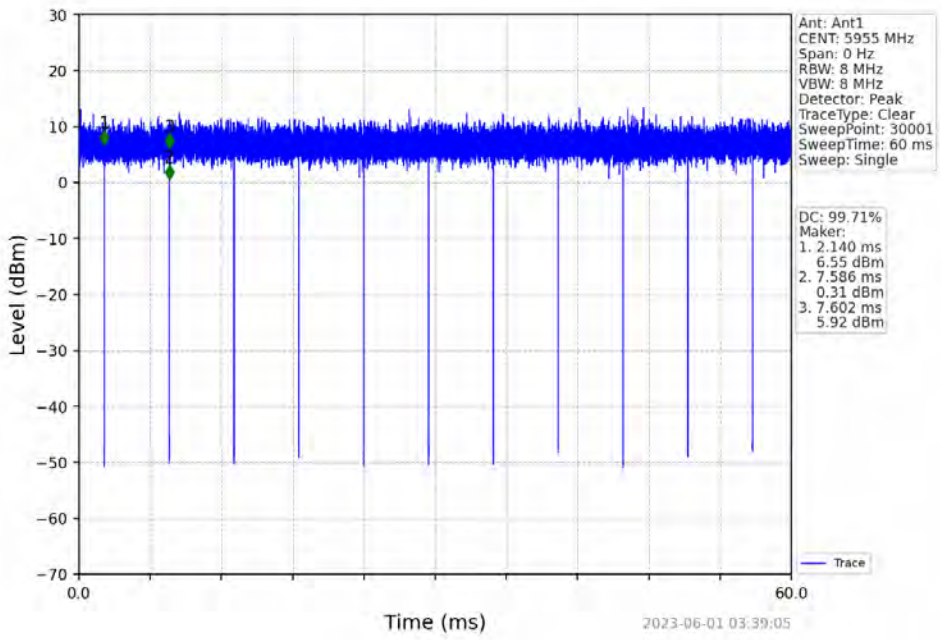
Ant2								
ENV	Mode	Frequency (MHz)	RU	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
NTNV	802.11ax (HEW20)	6875	SU	5.446	5.462	99.71	0.01	0.04
	802.11ax (HEW40)	6885	SU	5.446	5.462	99.71	0.01	0.04
	802.11ax (HEW80)	6865	SU	5.412	5.460	99.12	0.04	0.04
	802.11ax (HEW160)	6825	SU	5.445	5.460	99.73	0.01	0.00

Ant1								
ENV	Mode	Frequency (MHz)	RU	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
NTNV	802.11ax (HEW40)	6525	SU	5.445	5.462	99.69	0.01	0.03
	802.11ax (HEW80)	6545	SU	5.412	5.460	99.12	0.04	0.04
	802.11ax (HEW160)	6505	SU	5.444	5.460	99.71	0.01	0.04

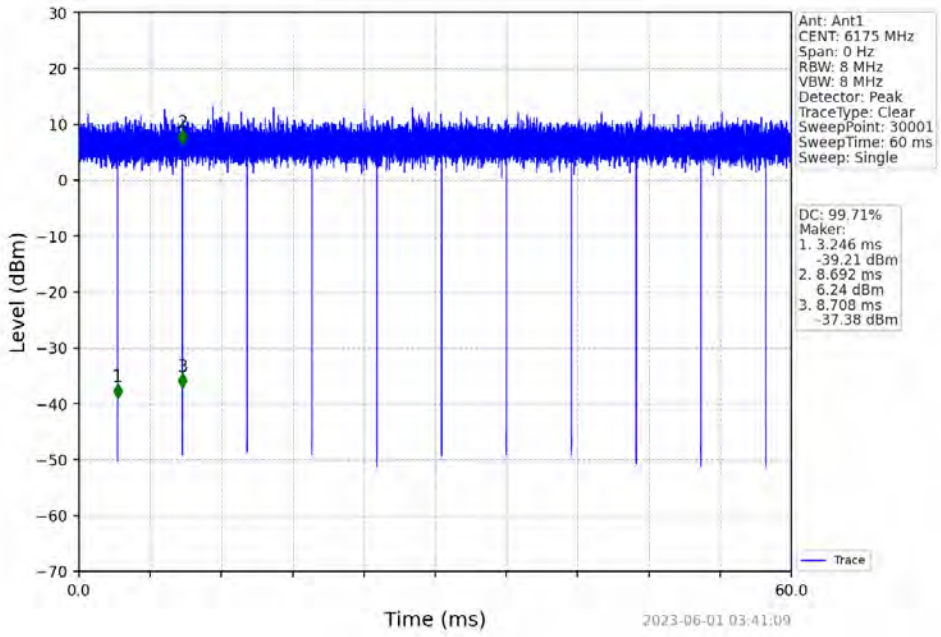
Ant2								
ENV	Mode	Frequency (MHz)	RU	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
NTNV	802.11ax (HEW40)	6525	SU	5.446	5.462	99.71	0.01	0.04
	802.11ax (HEW80)	6545	SU	5.412	5.460	99.12	0.04	0.04
	802.11ax (HEW160)	6505	SU	5.444	5.460	99.71	0.01	0.04

Test Graph

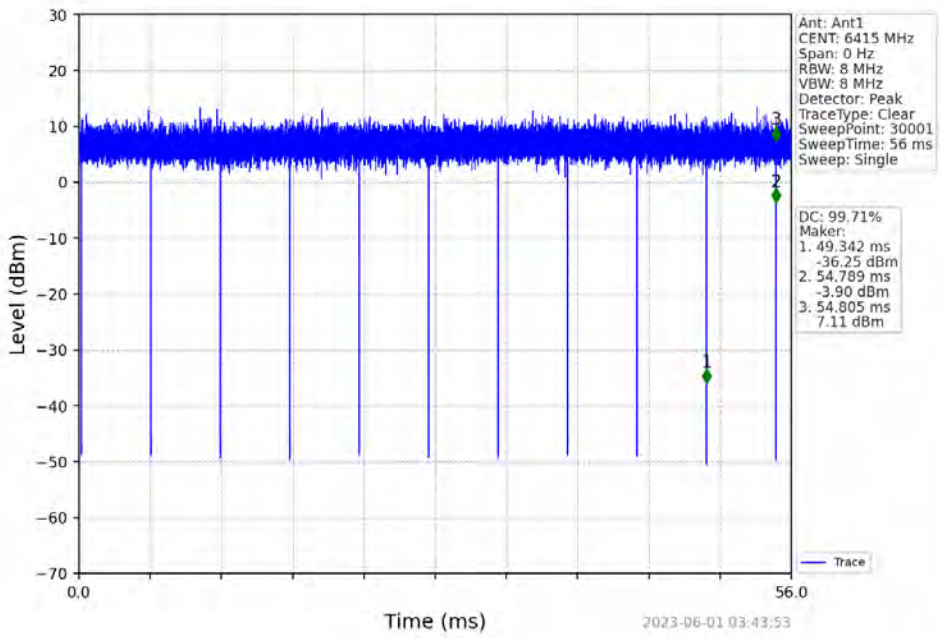
802.11ax(HEW20)_LCH_5955MHz_SU_Ant1_NTNV



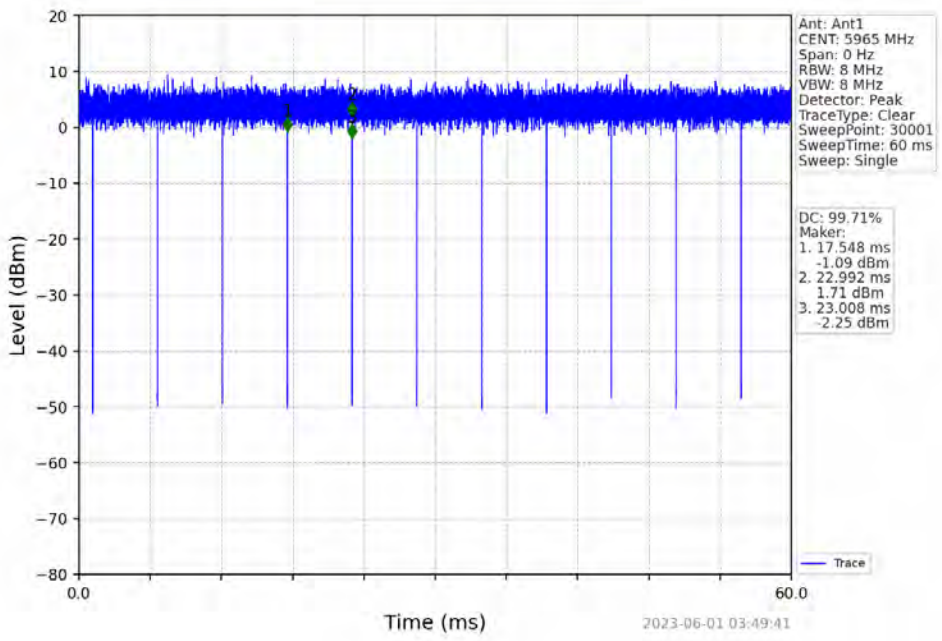
802.11ax(HEW20)_MCH_6175MHz_SU_Ant1_NTNV



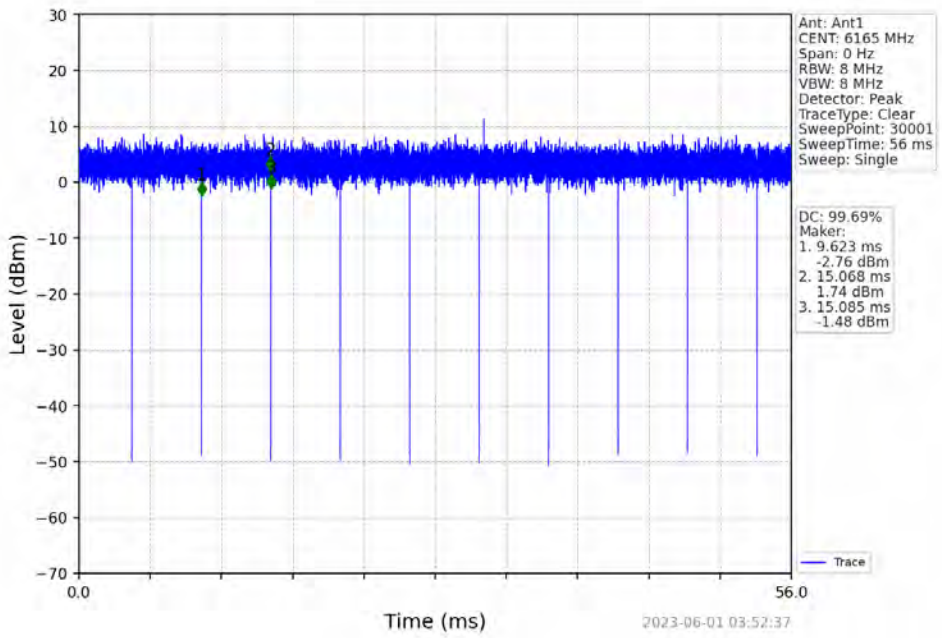
802.11ax(HEW20)_HCH_6415MHz_SU_Ant1_NTNV



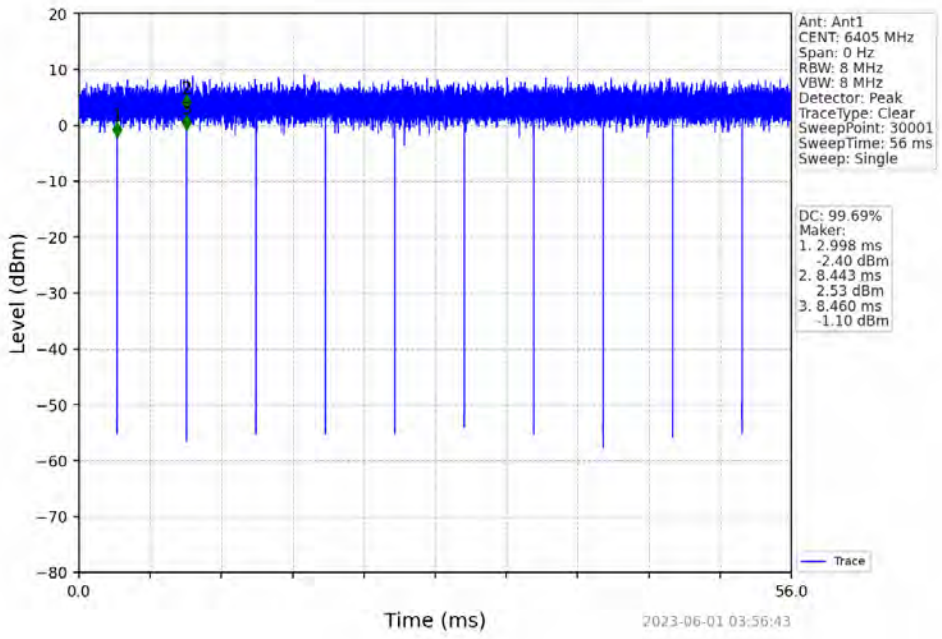
802.11ax(HEW40)_LCH_5965MHz_SU_Ant1_NTNV



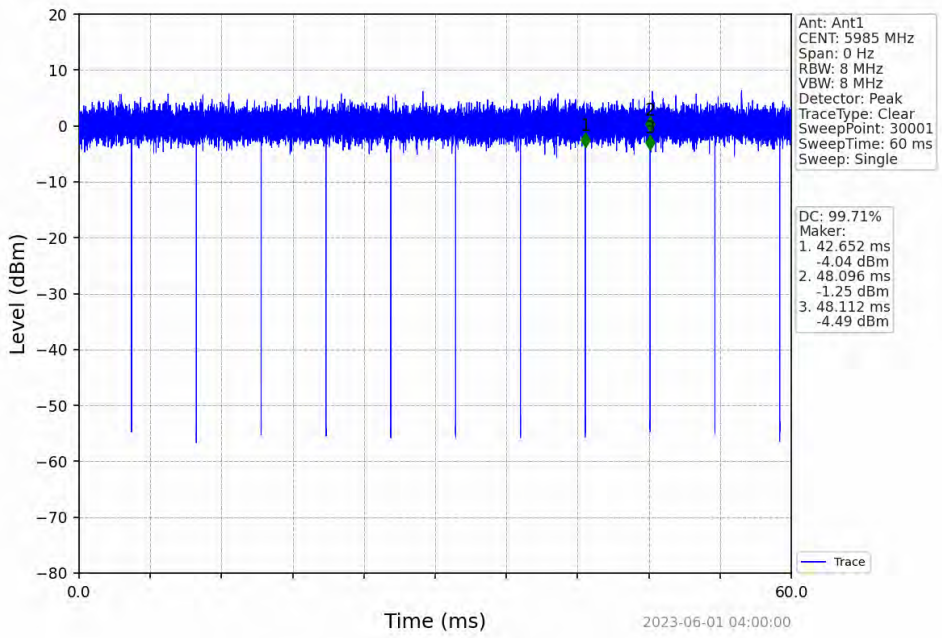
802.11ax(HEW40)_MCH_6165MHz_SU_Ant1_NTNV



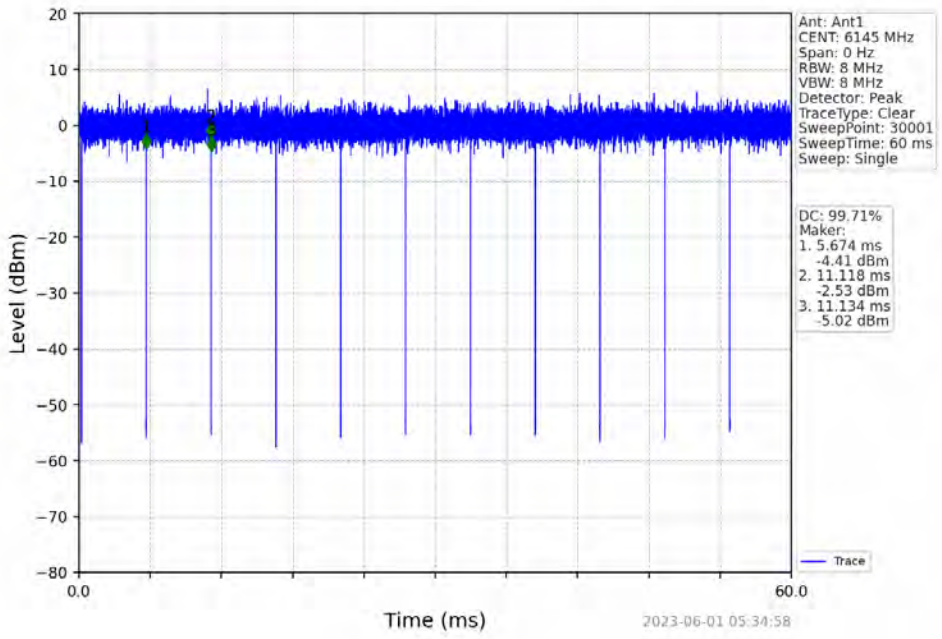
802.11ax(HEW40)_HCH_6405MHz_SU_Ant1_NTNV



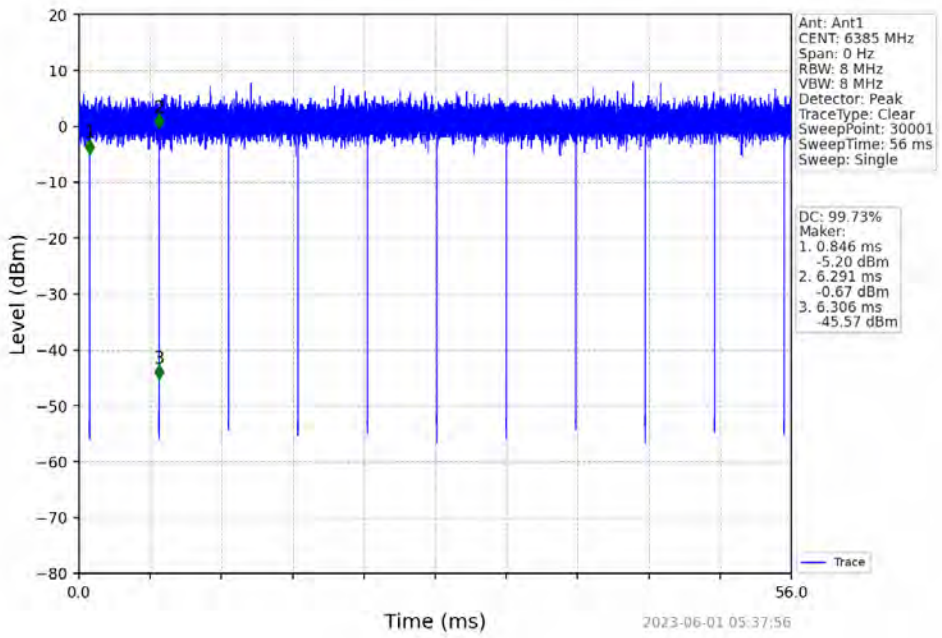
802.11ax(HEW80)_LCH_5985MHz_SU_Ant1_NTNV



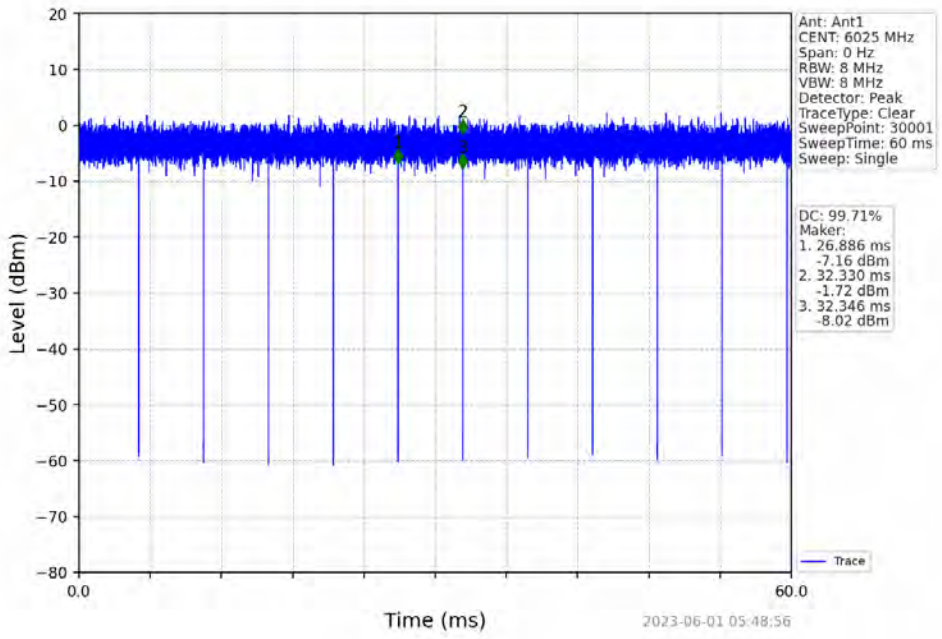
802.11ax(HEW80)_MCH_6145MHz_SU_Ant1_NTNV



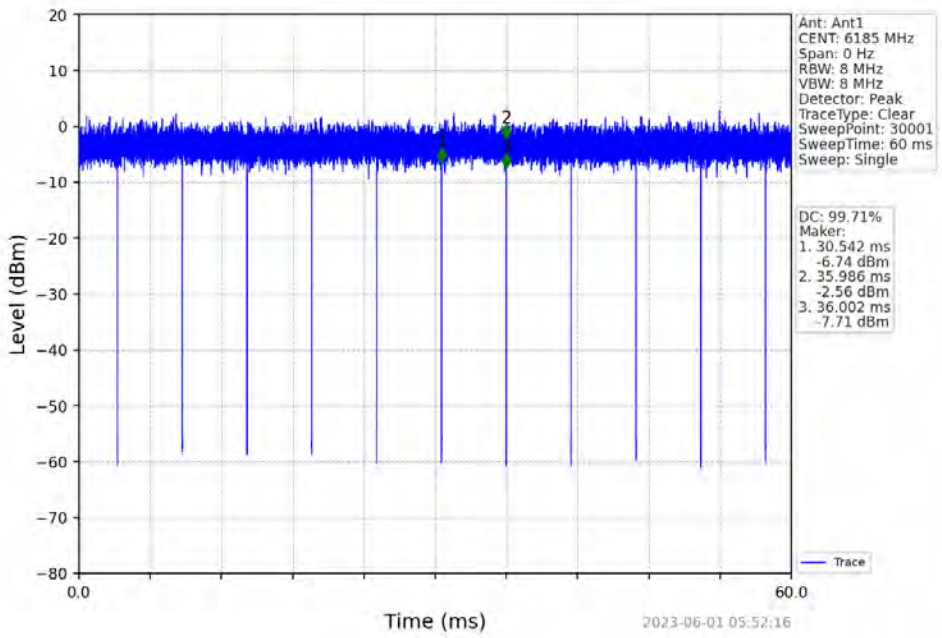
802.11ax(HEW80)_HCH_6385MHz_SU_Ant1_NTNV



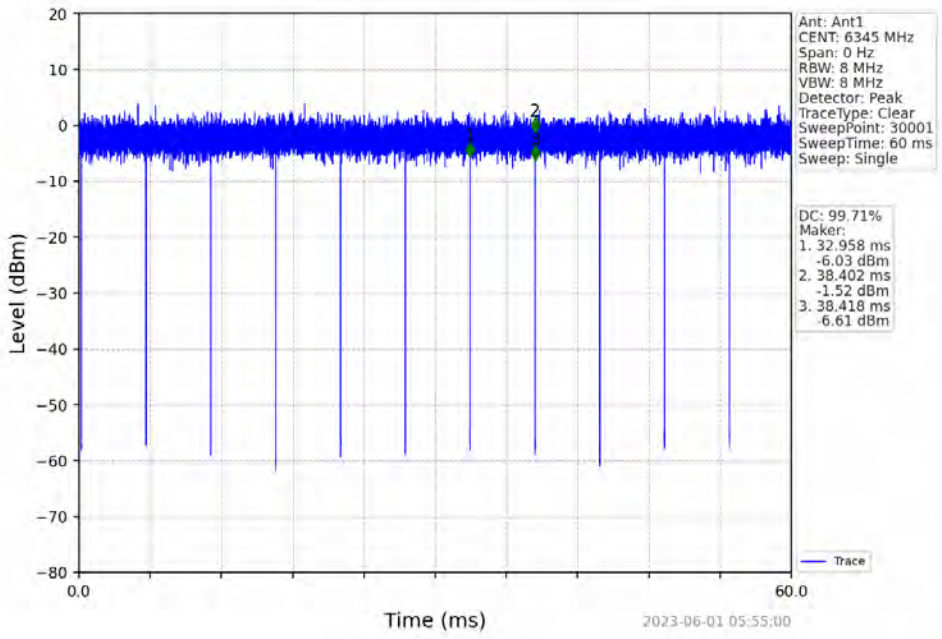
802.11ax(HEW160)_LCH_6025MHz_SU_Ant1_NTNV



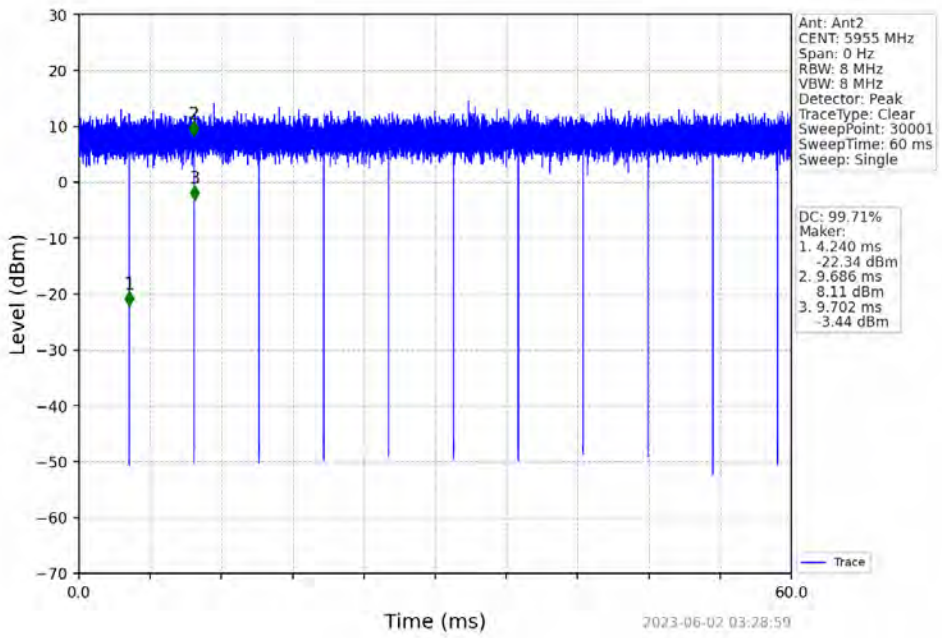
802.11ax(HEW160)_MCH_6185MHz_SU_Ant1_NTNV



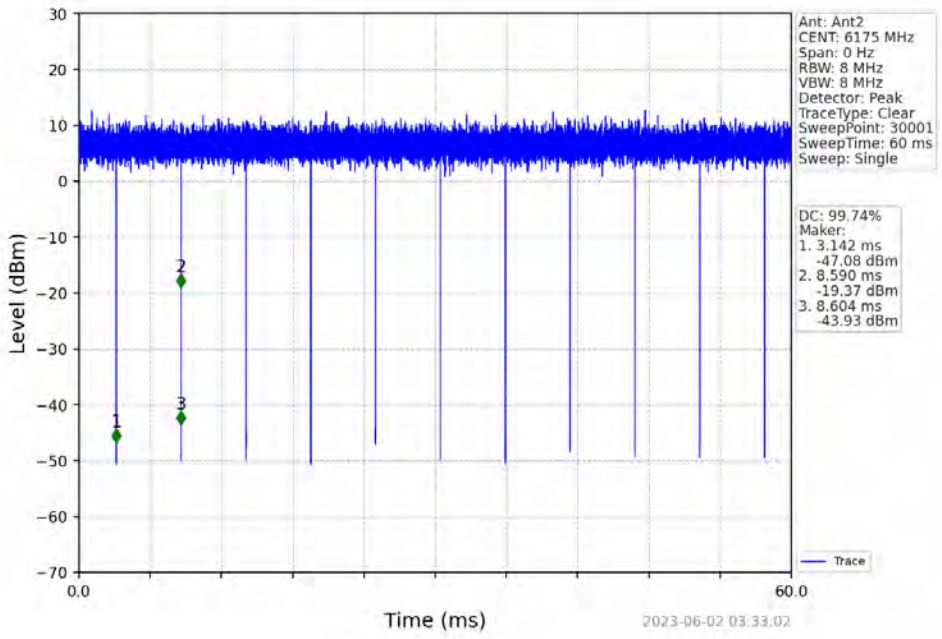
802.11ax(HEW160)_HCH_6345MHz_SU_Ant1_NTNV



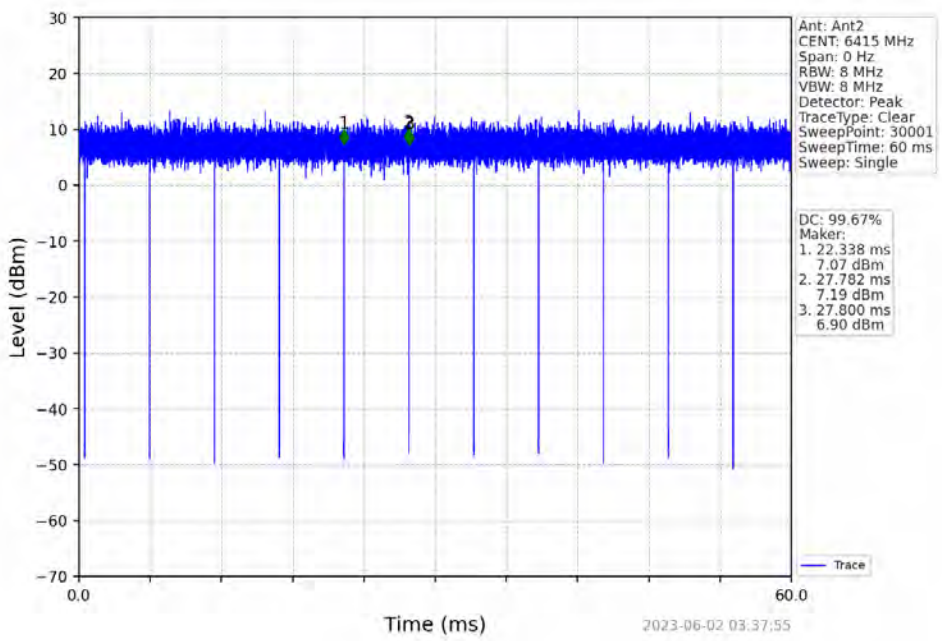
802.11ax(HEW20)_LCH_5955MHz_SU_Ant2_NTNV



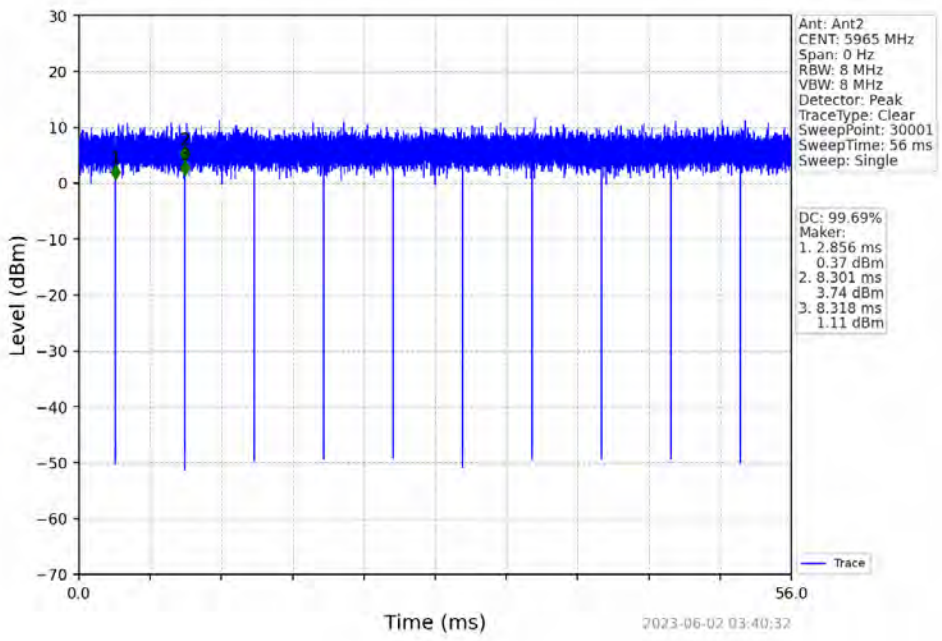
802.11ax(HEW20)_MCH_6175MHz_SU_Ant2_NTNV



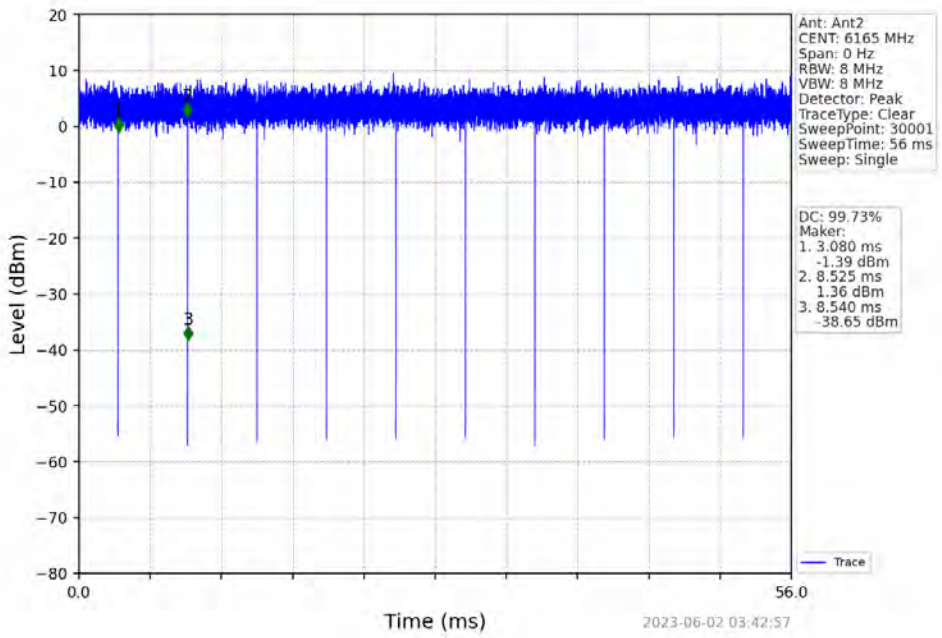
802.11ax(HEW20)_HCH_6415MHz_SU_Ant2_NTNV



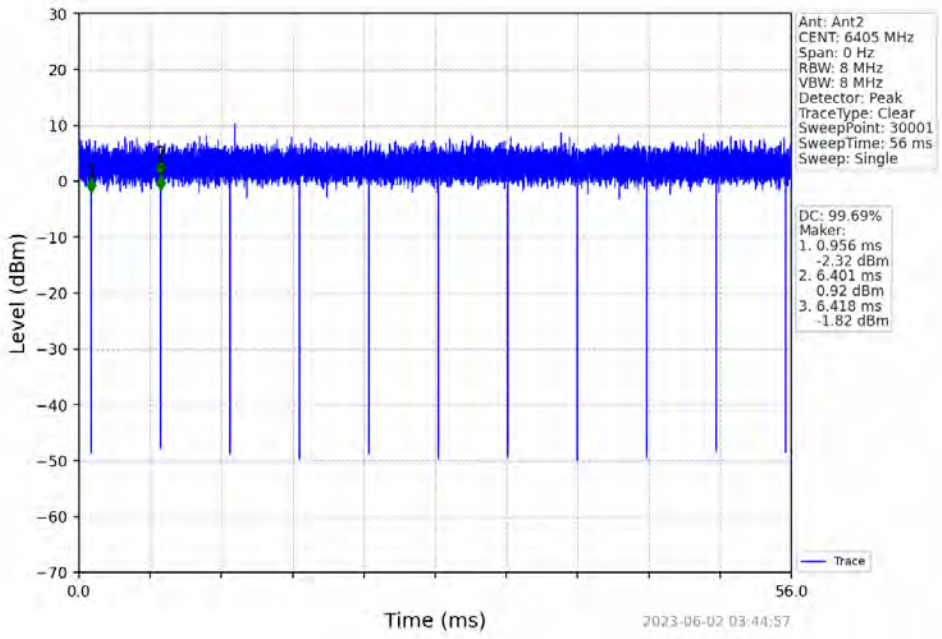
802.11ax(HEW40)_LCH_5965MHz_SU_Ant2_NTNV



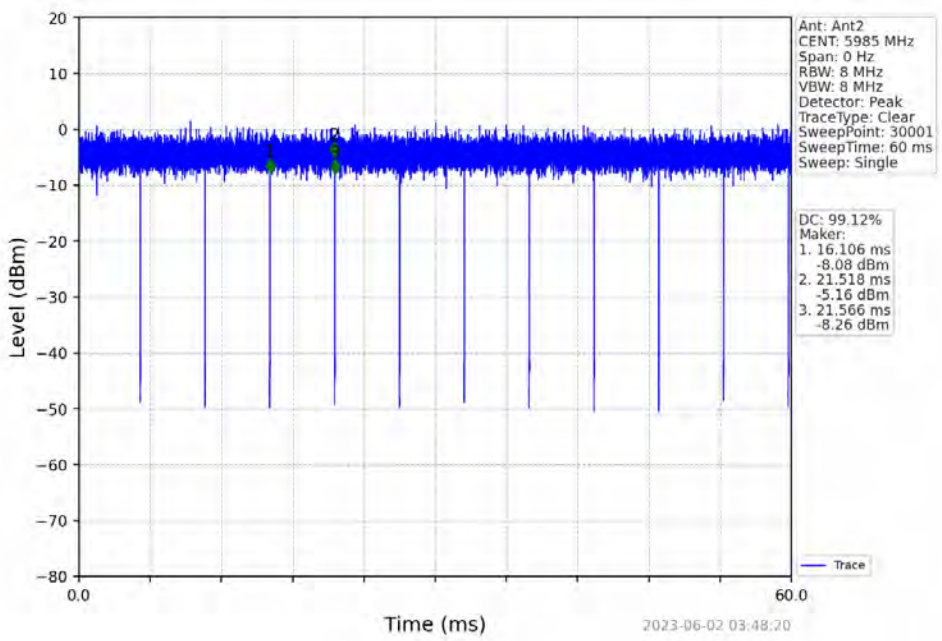
802.11ax(HEW40)_MCH_6165MHz_SU_Ant2_NTNV



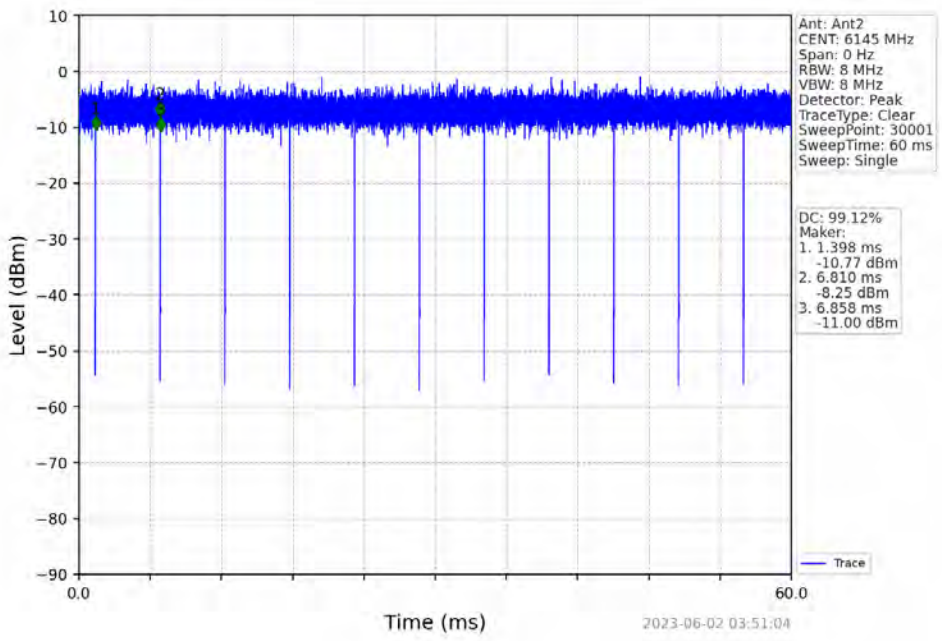
802.11ax(HEW40)_HCH_6405MHz_SU_Ant2_NTNV



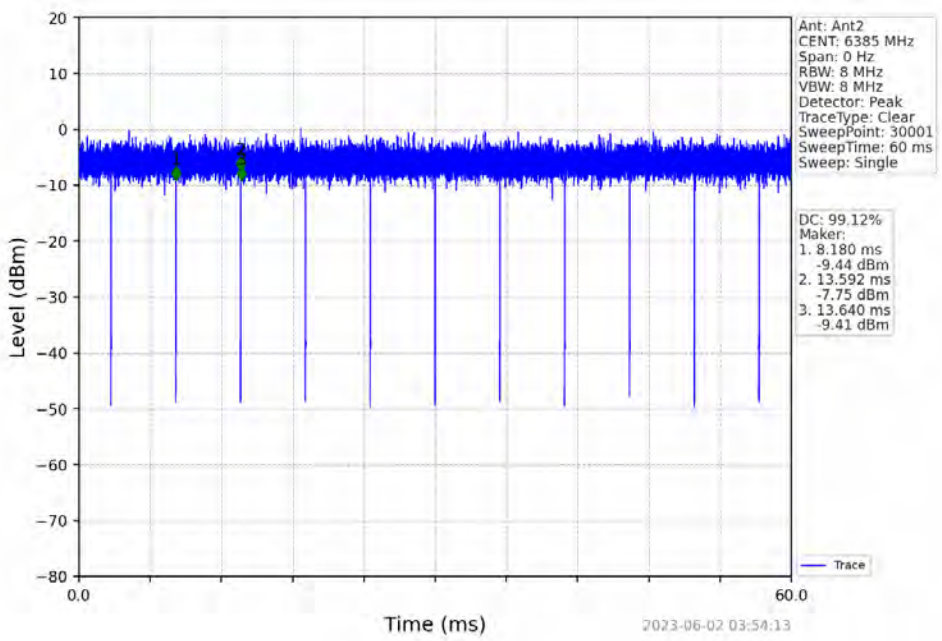
802.11ax(HEW80)_LCH_5985MHz_SU_Ant2_NTNV



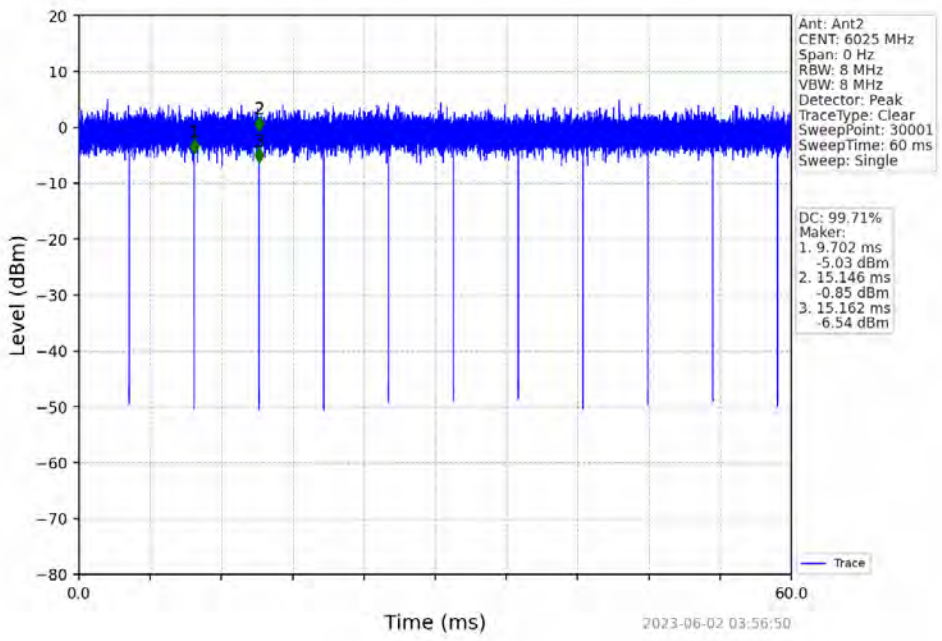
802.11ax(HEW80)_MCH_6145MHz_SU_Ant2_NTNV



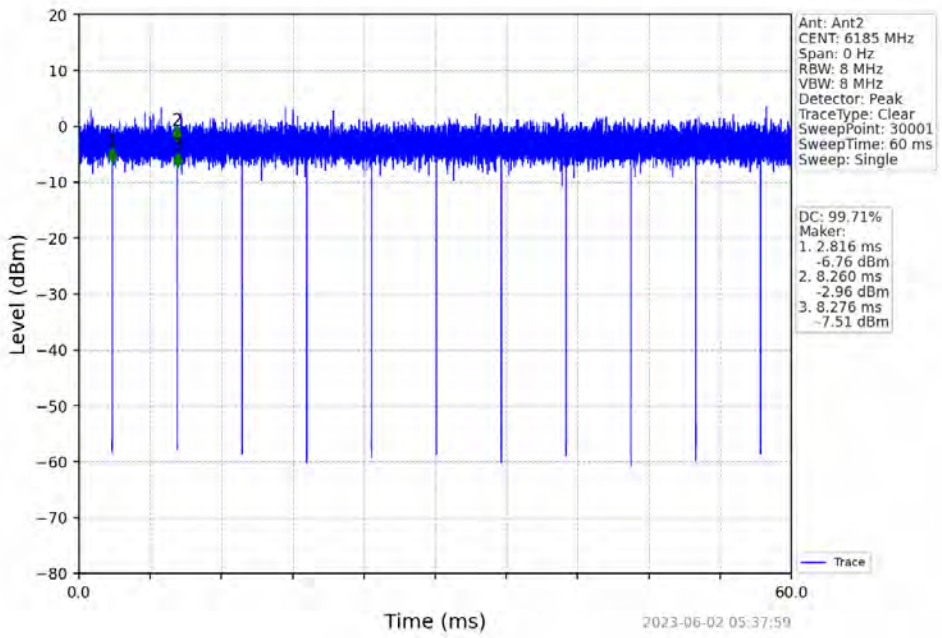
802.11ax(HEW80)_HCH_6385MHz_SU_Ant2_NTNV



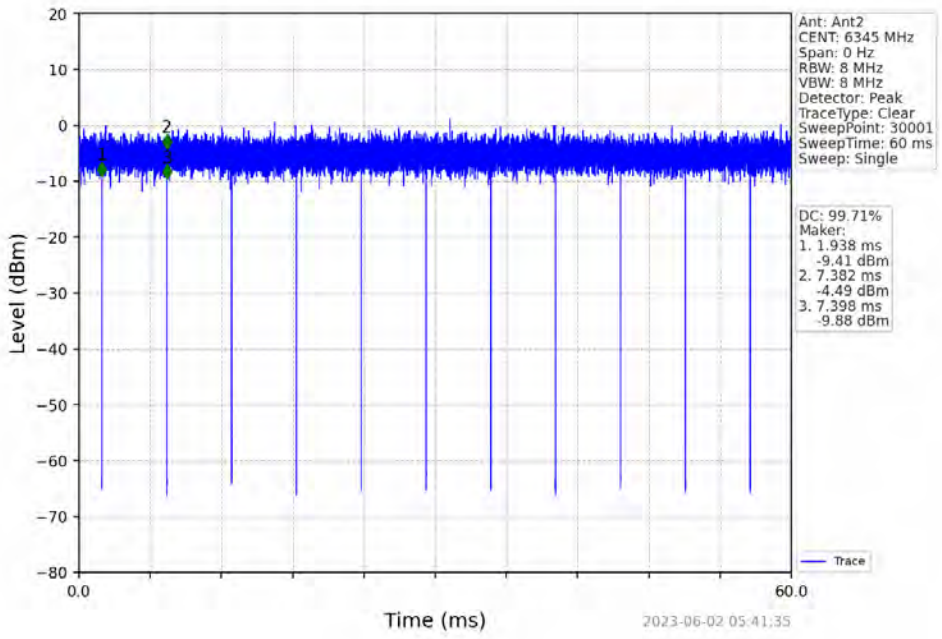
802.11ax(HEW160)_LCH_6025MHz_SU_Ant2_NTNV



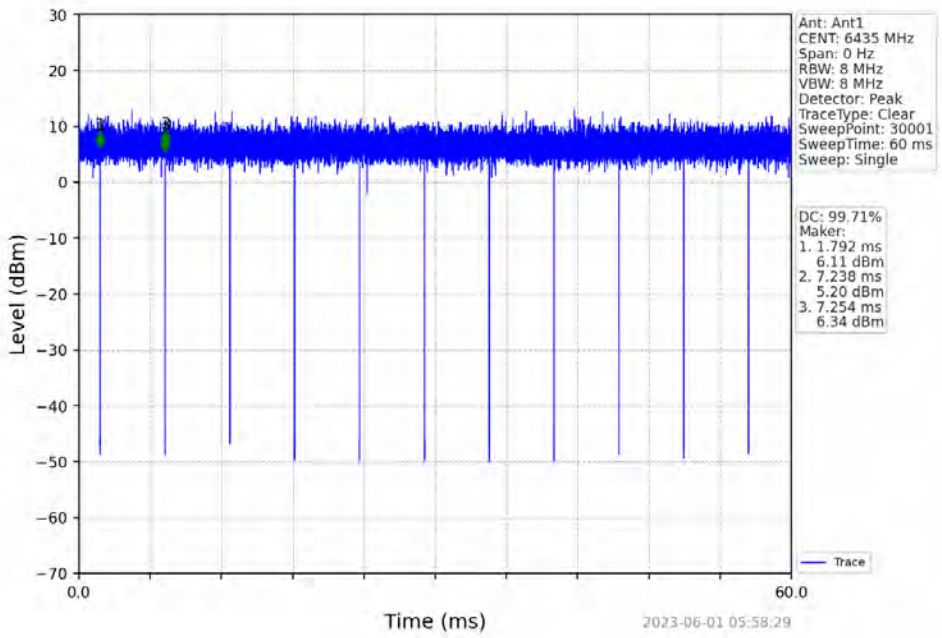
802.11ax(HEW160)_MCH_6185MHz_SU_Ant2_NTNV



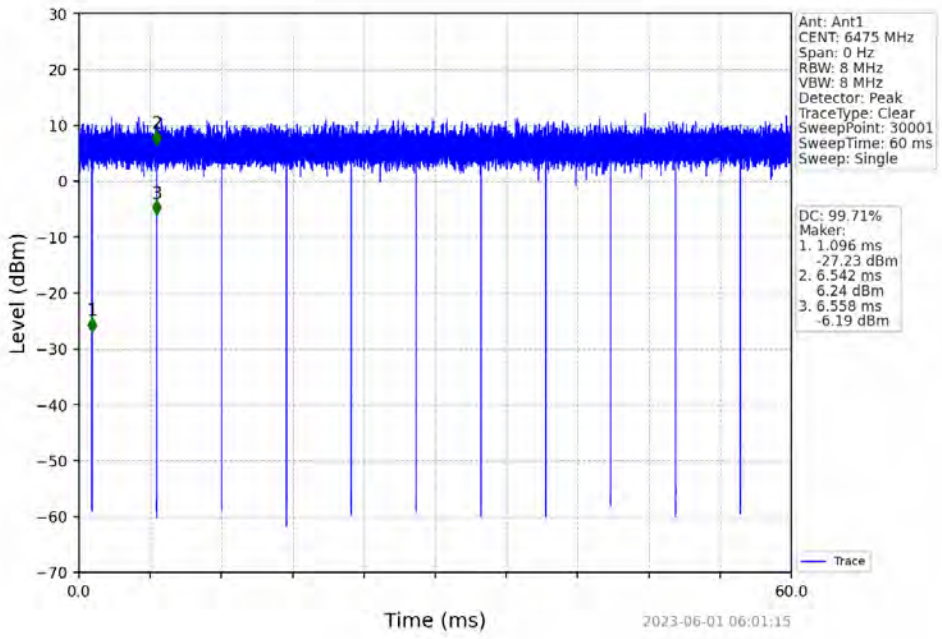
802.11ax(HEW160)_HCH_6345MHz_SU_Ant2_NTNV



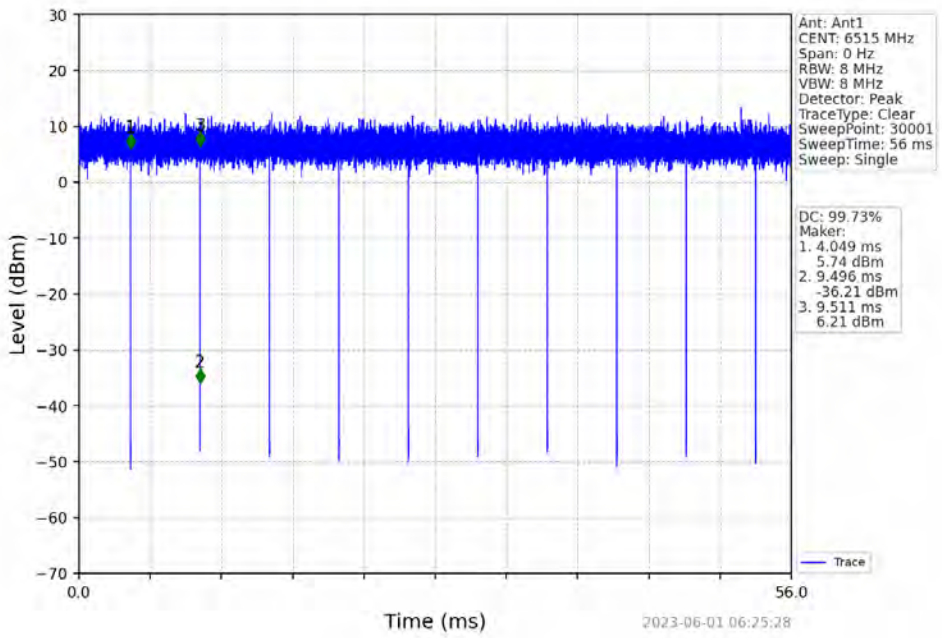
802.11ax(HEW20)_LCH_6435MHz_SU_Ant1_NTNV



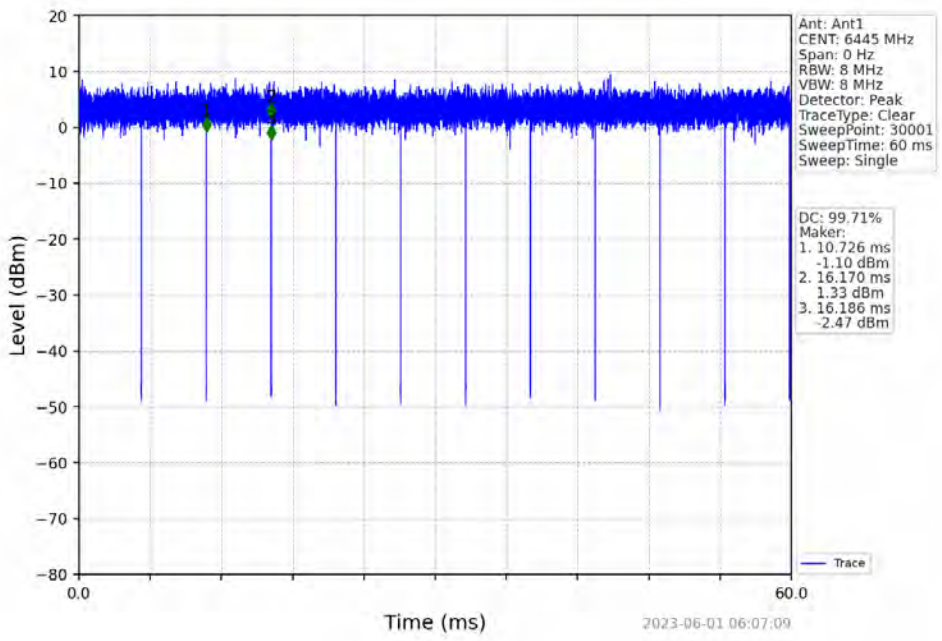
802.11ax(HEW20)_MCH_6475MHz_SU_Ant1_NTNV



802.11ax(HEW20)_HCH_6515MHz_SU_Ant1_NTNV



802.11ax(HEW40)_LCH_6445MHz_SU_Ant1_NTNV



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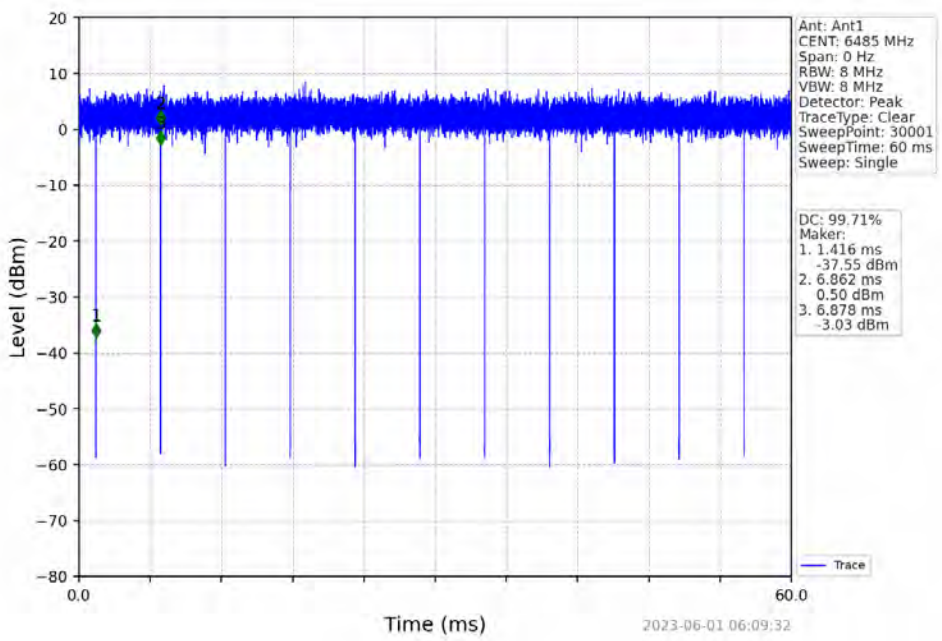

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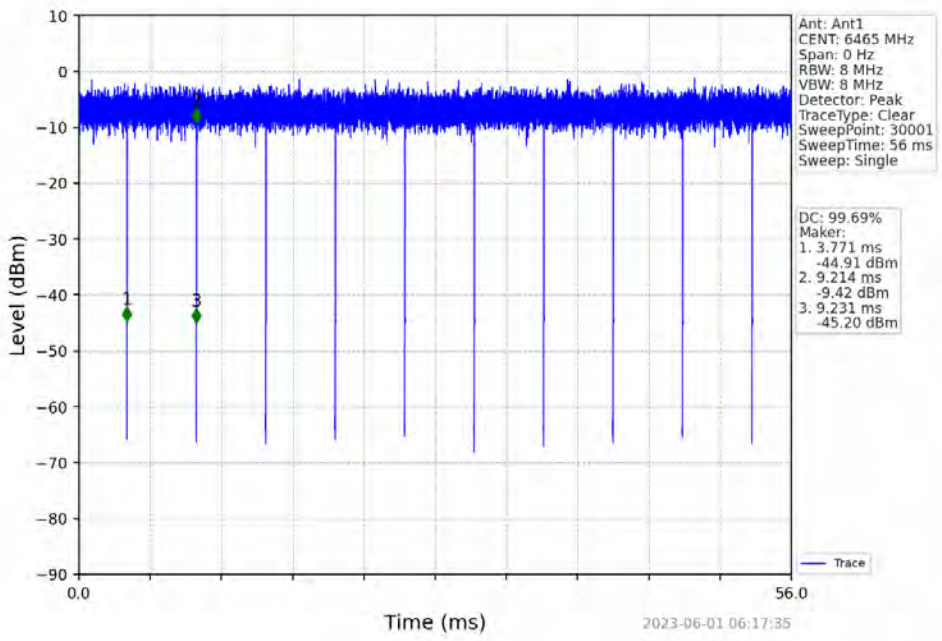

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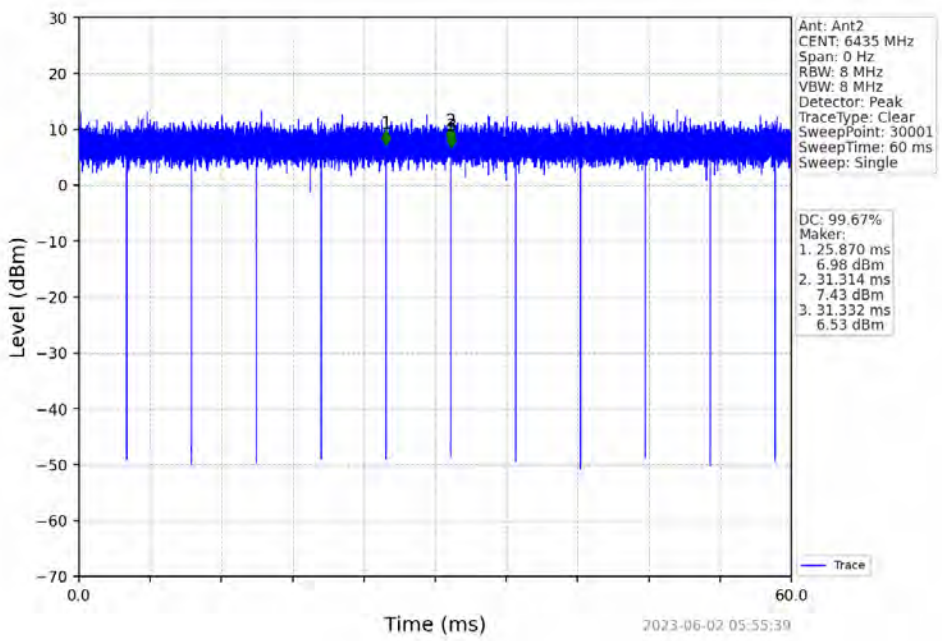

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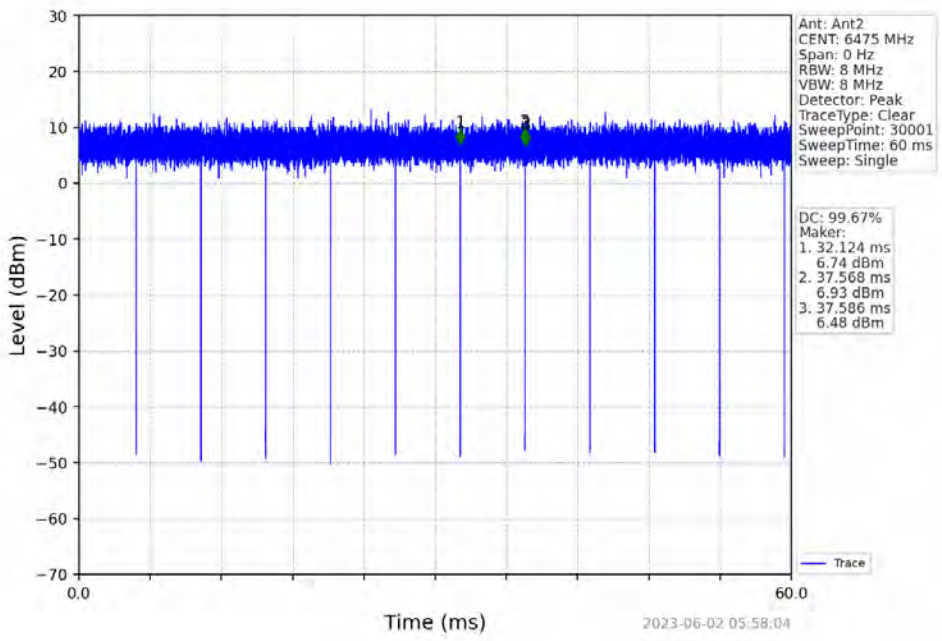

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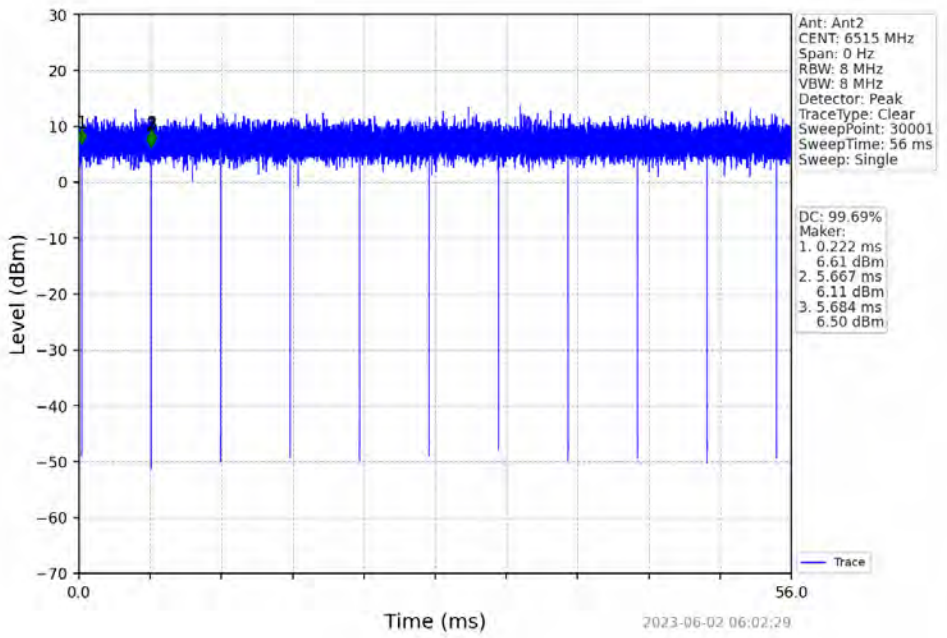

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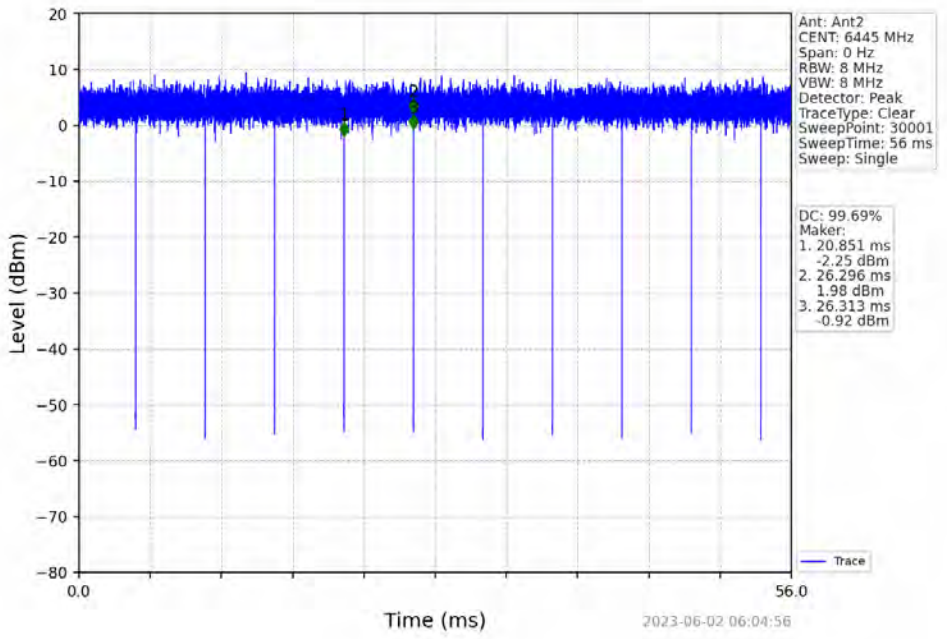

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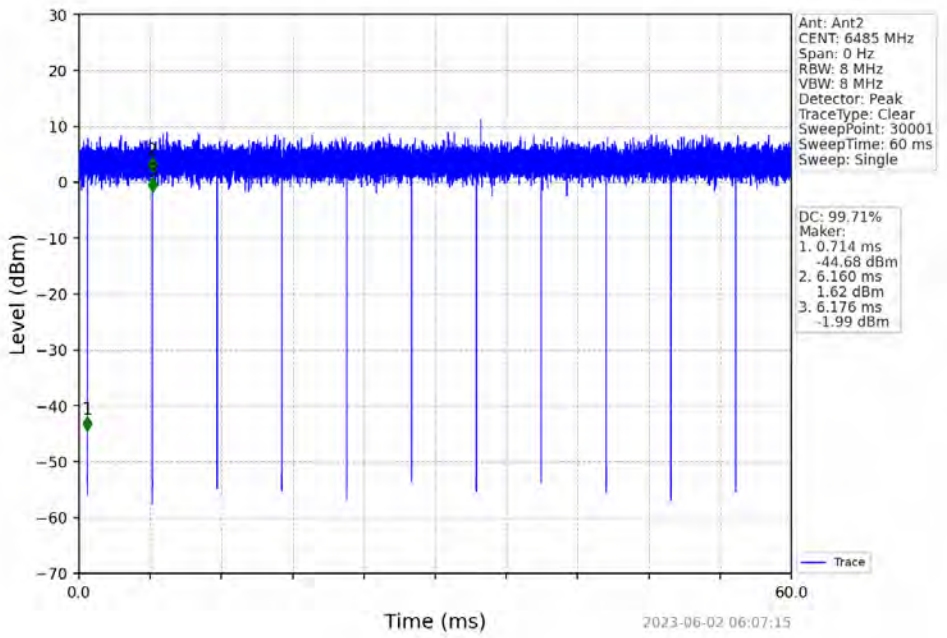

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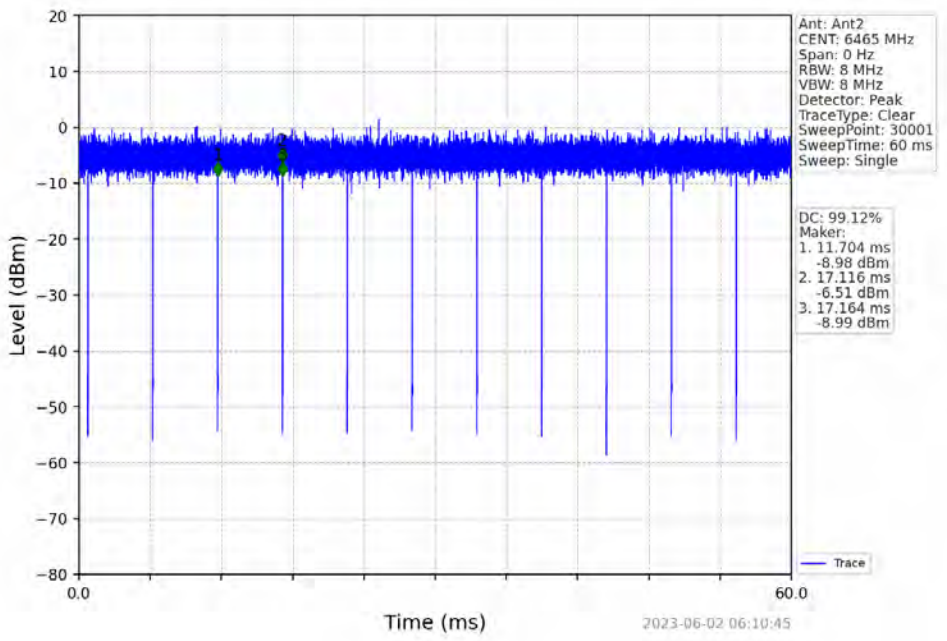

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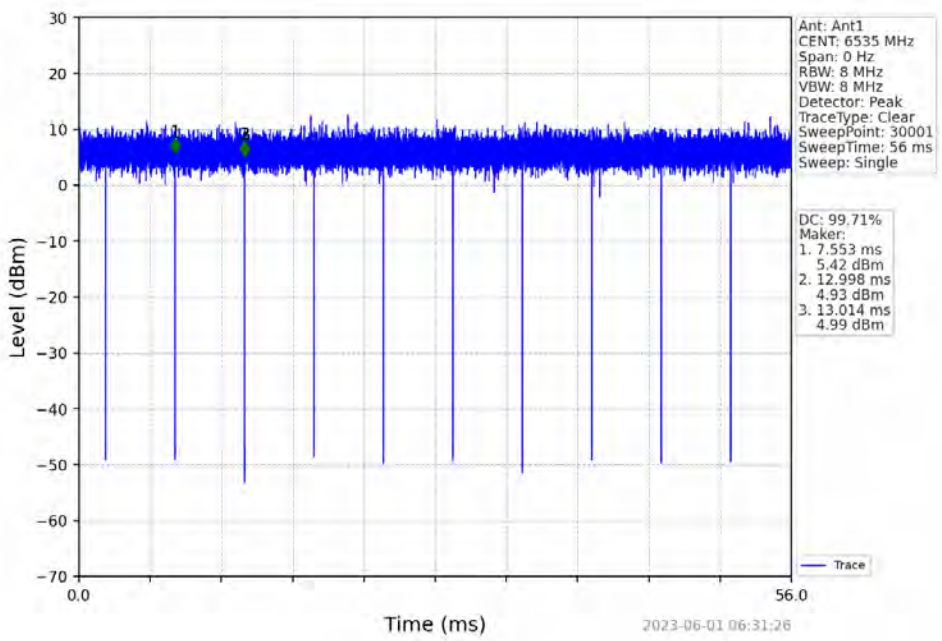

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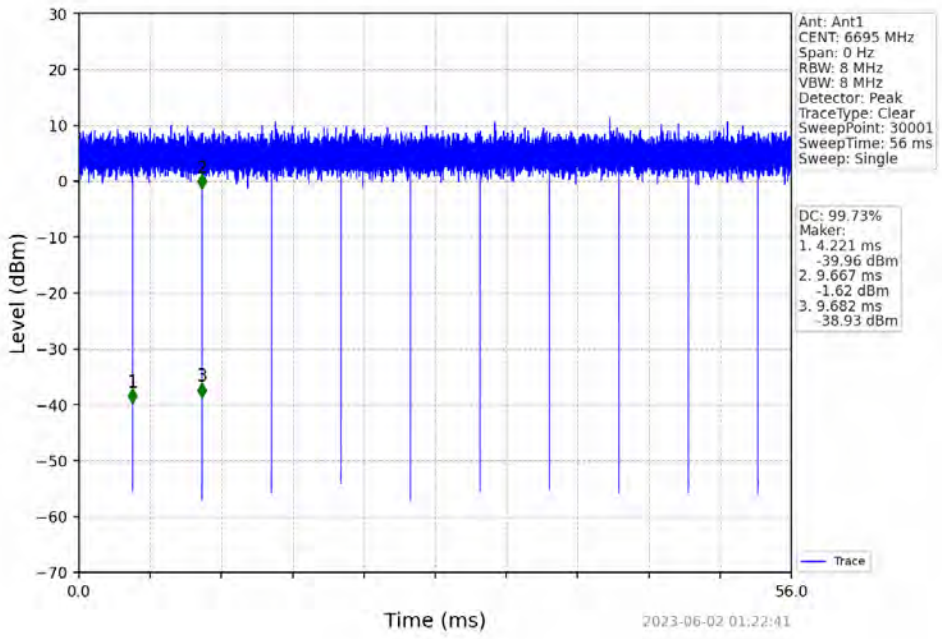

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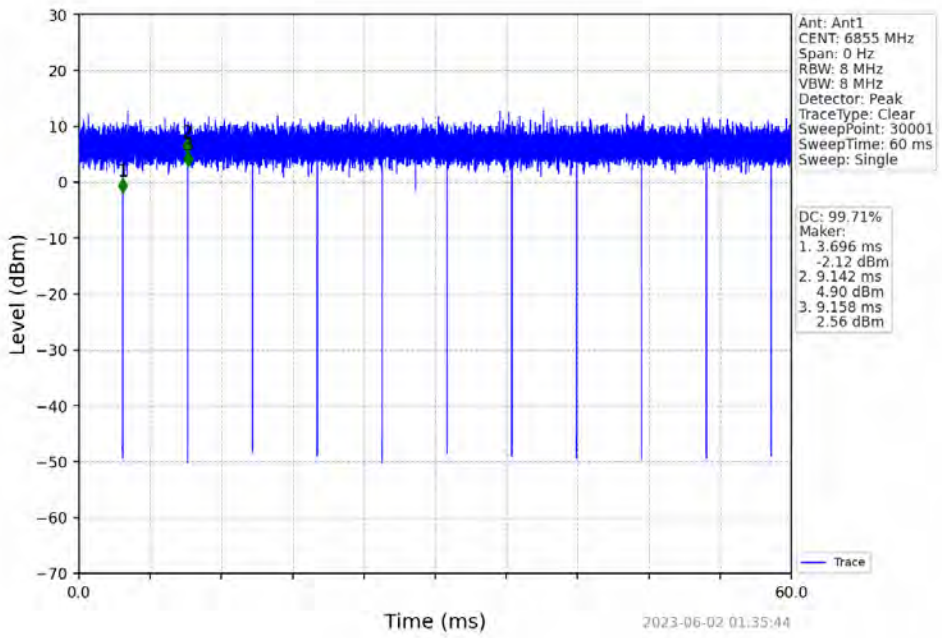

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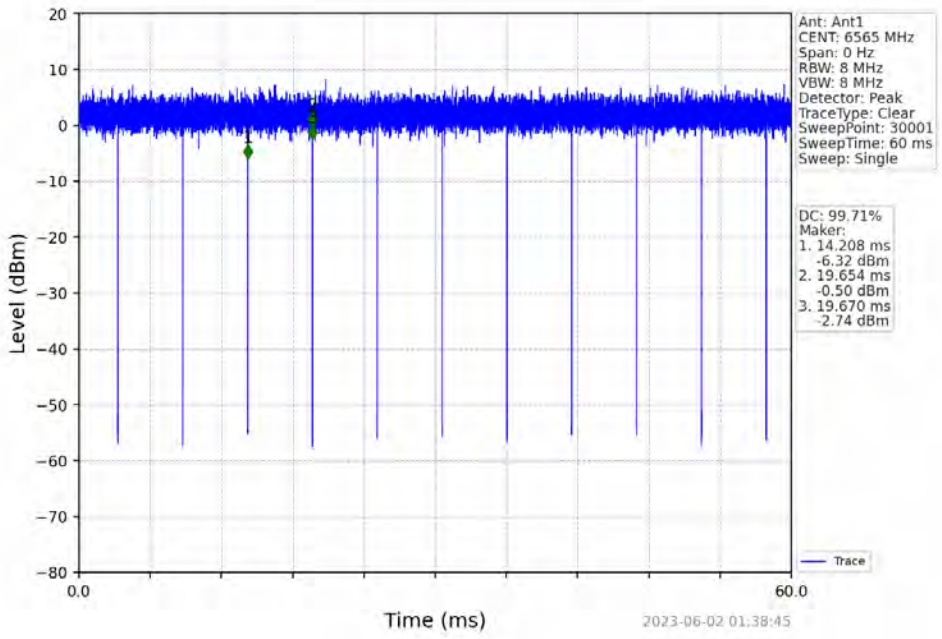
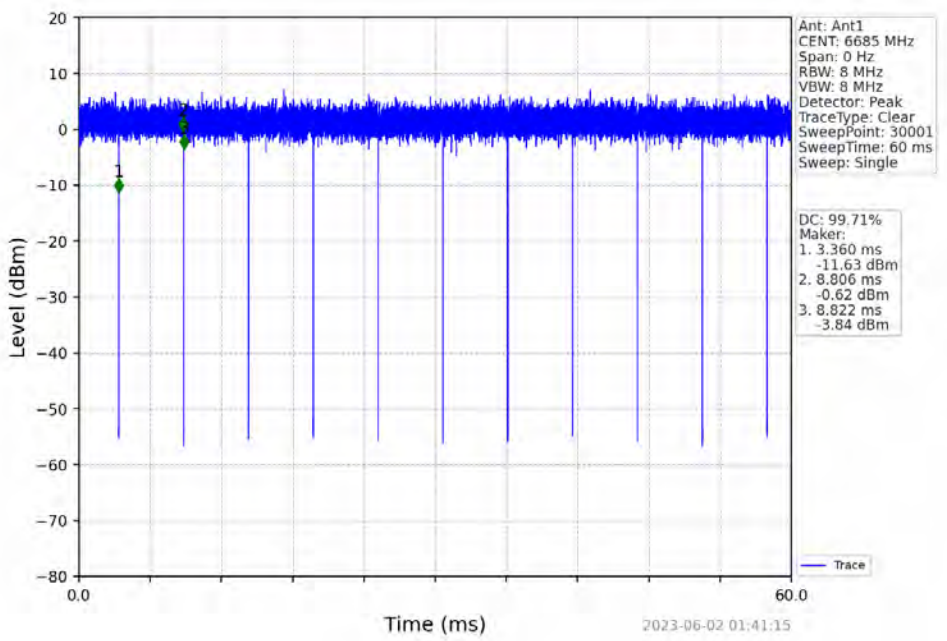
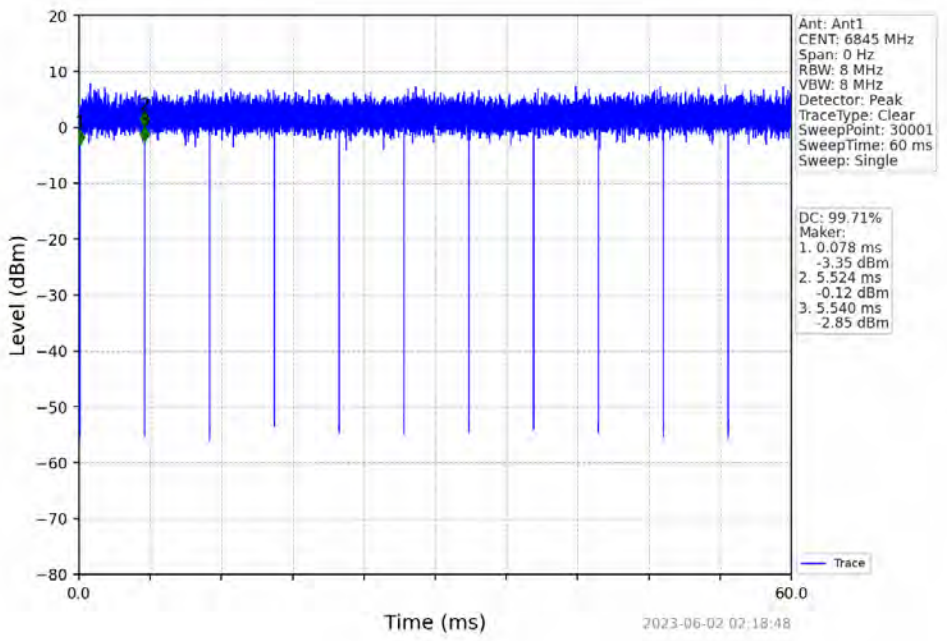


802.11ax(HEW40)_MCH_6685MHz_SU_Ant1_NTNV



802.11ax(HEW40)_HCH_6845MHz_SU_Ant1_NTNV



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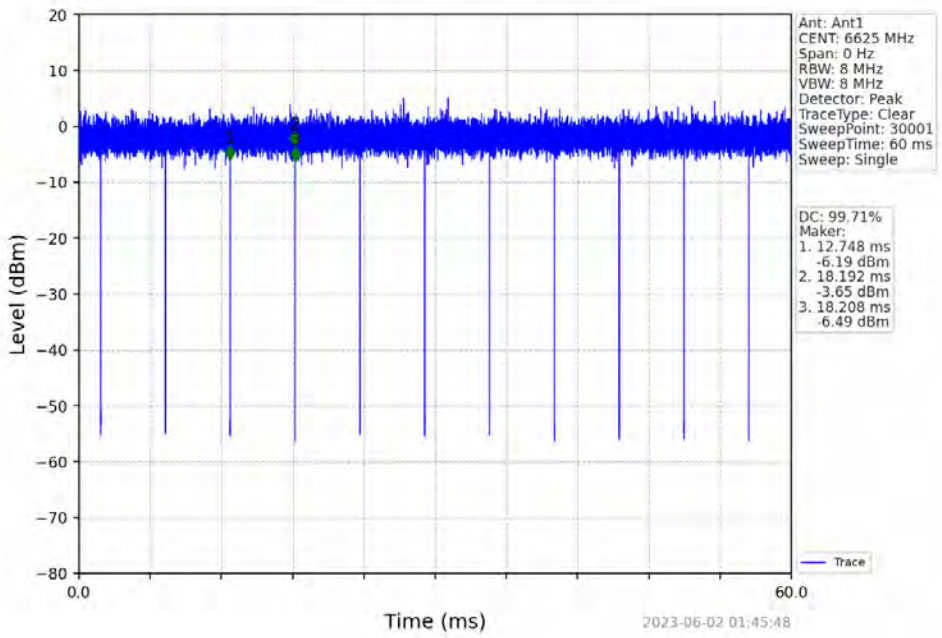

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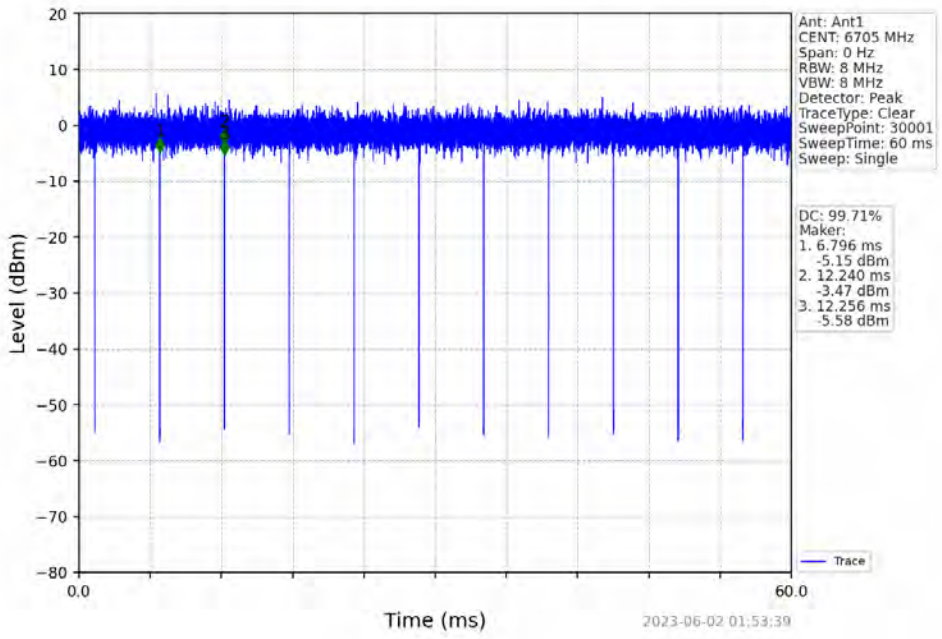

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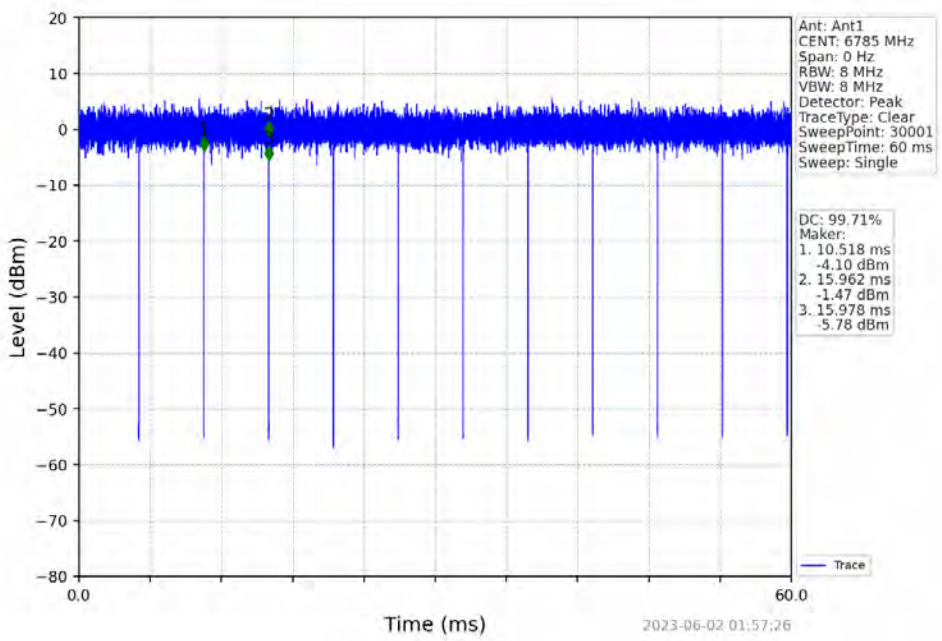

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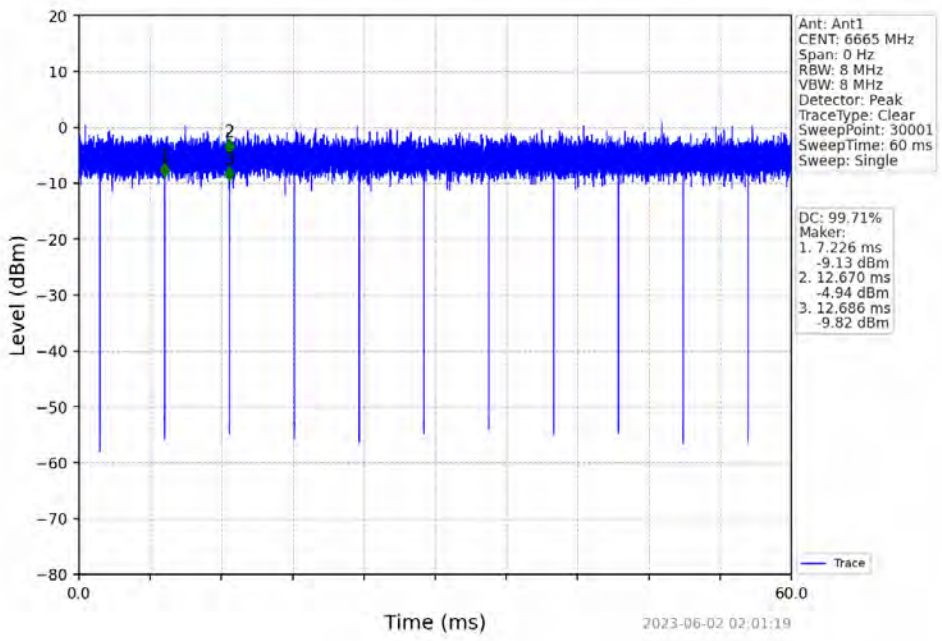

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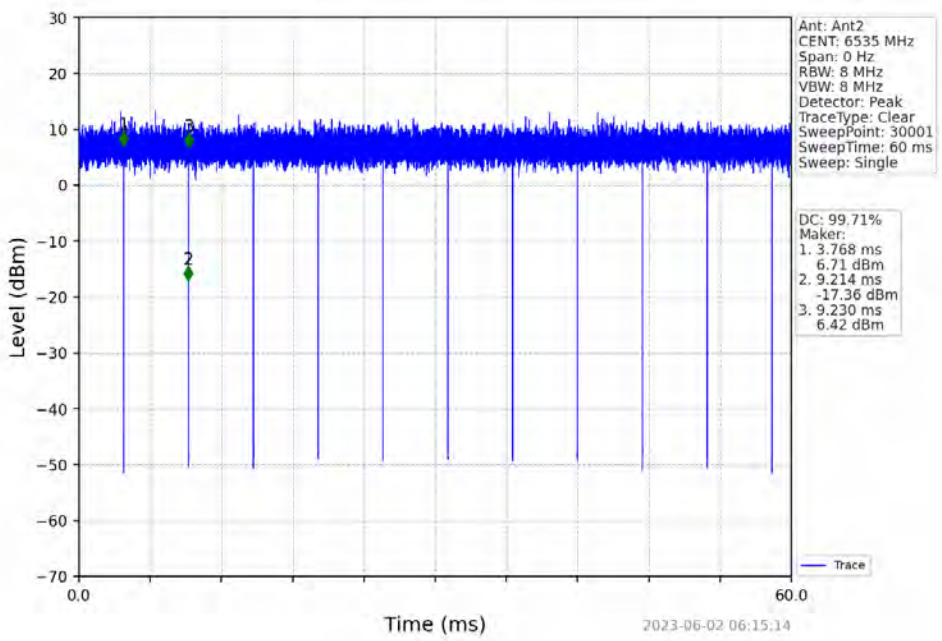

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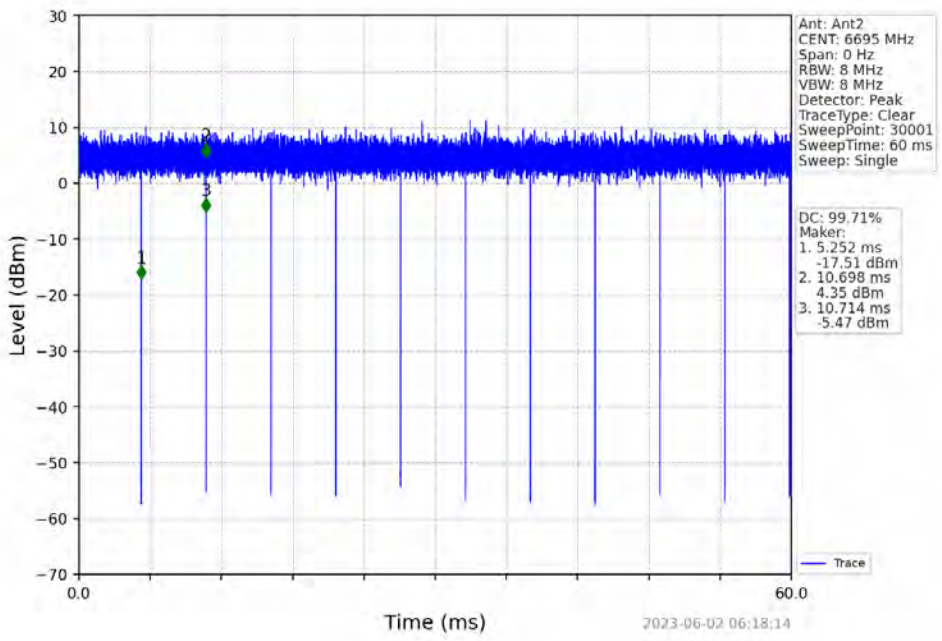

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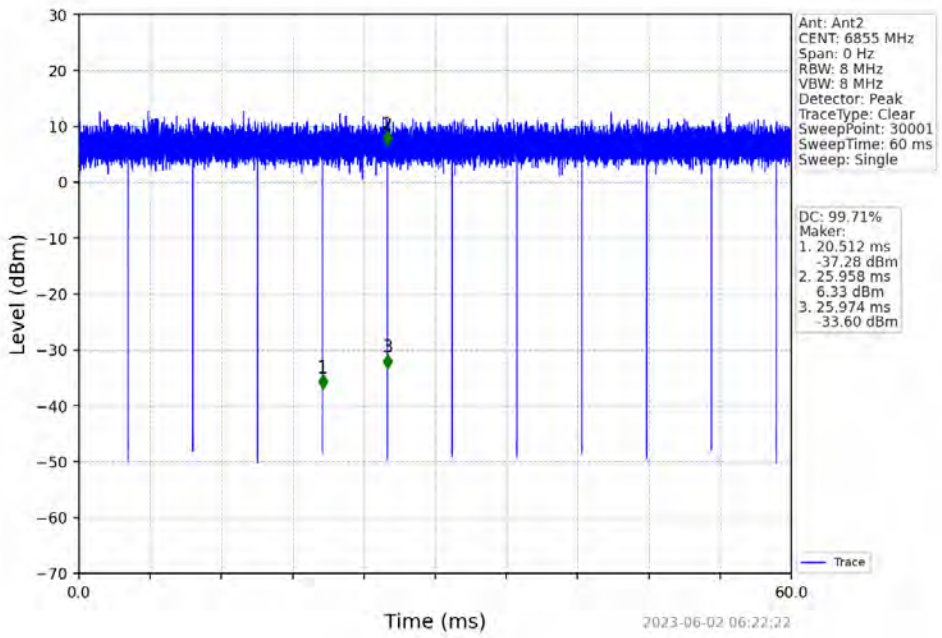

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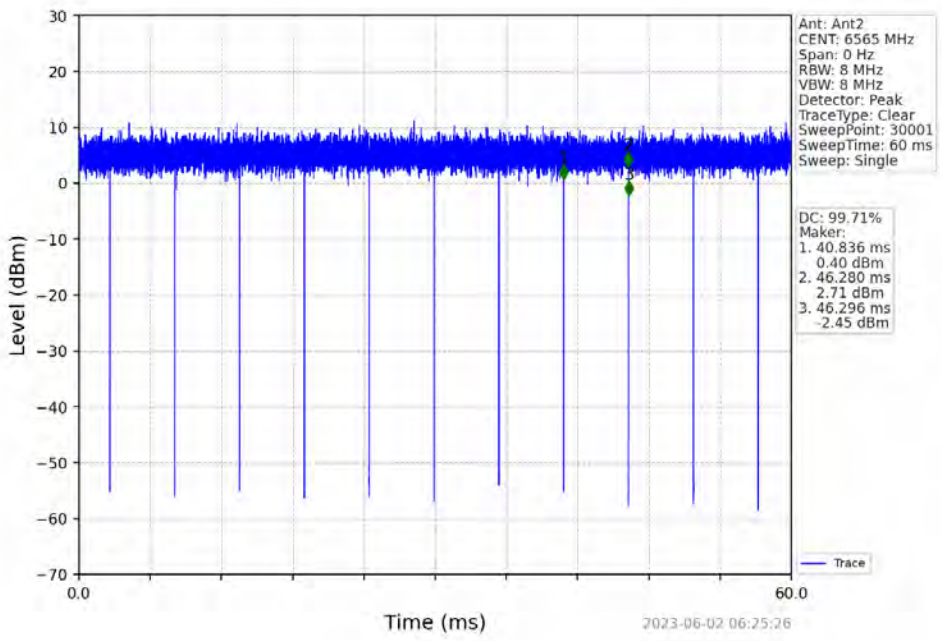

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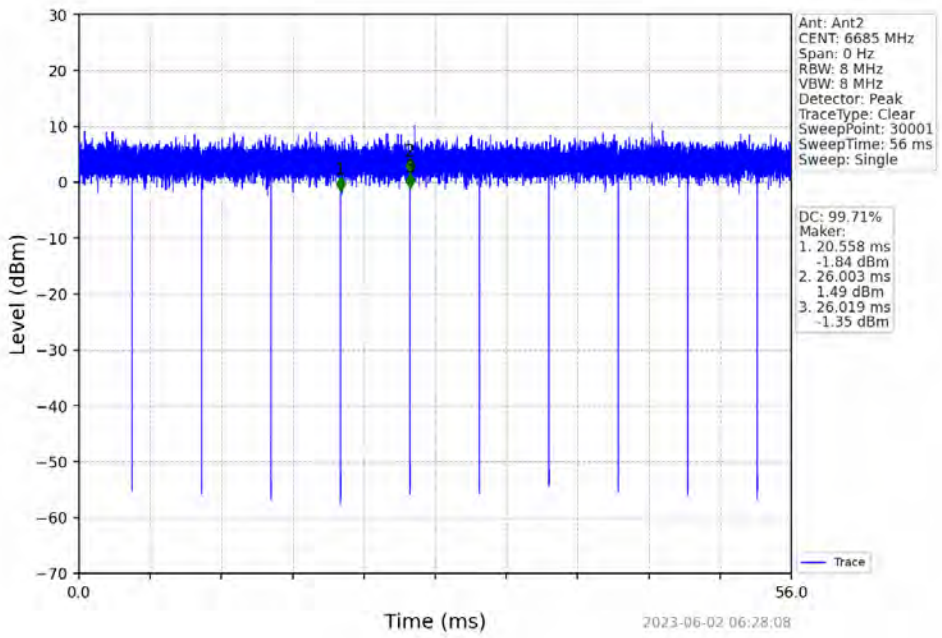

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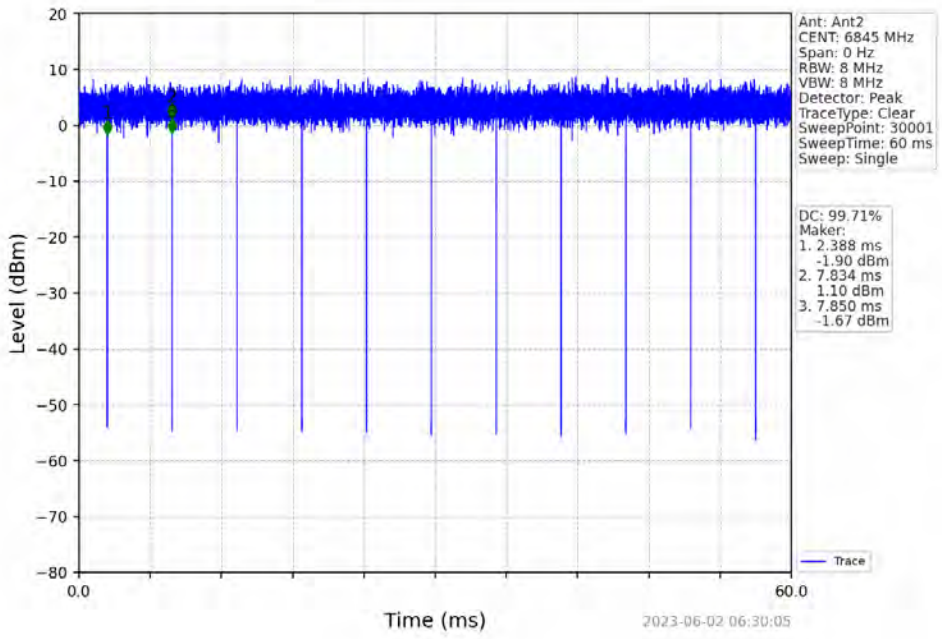

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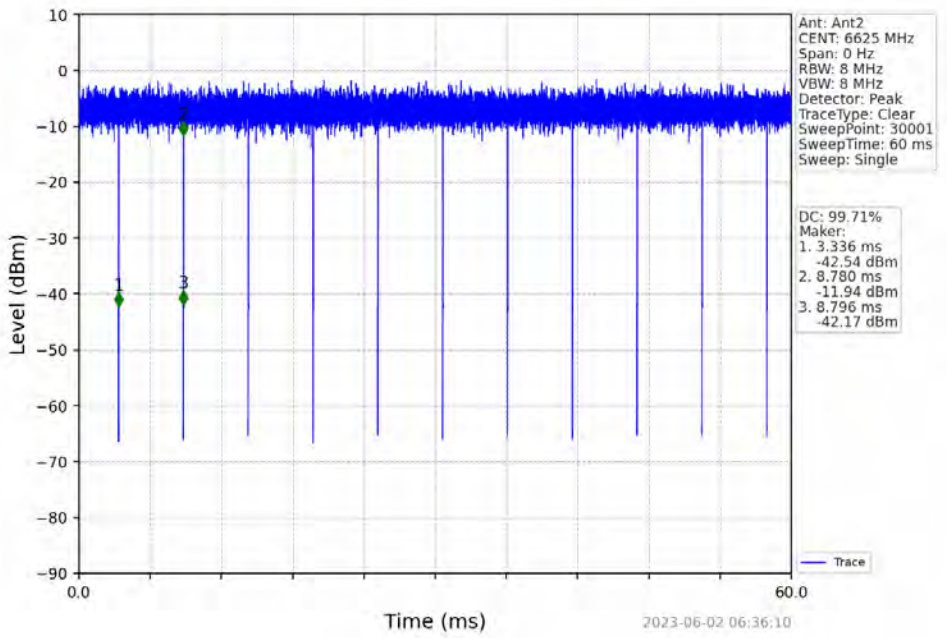

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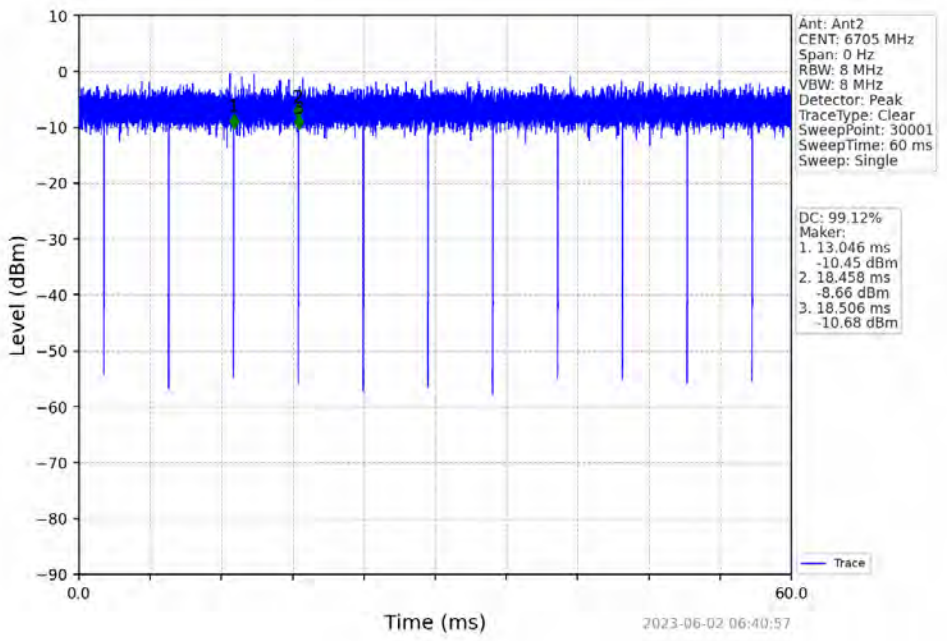

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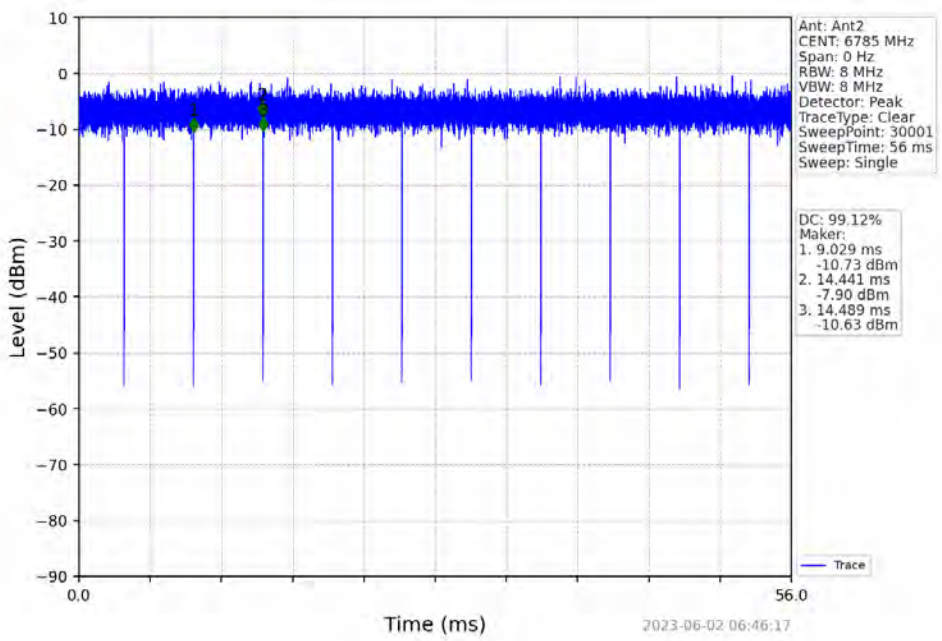

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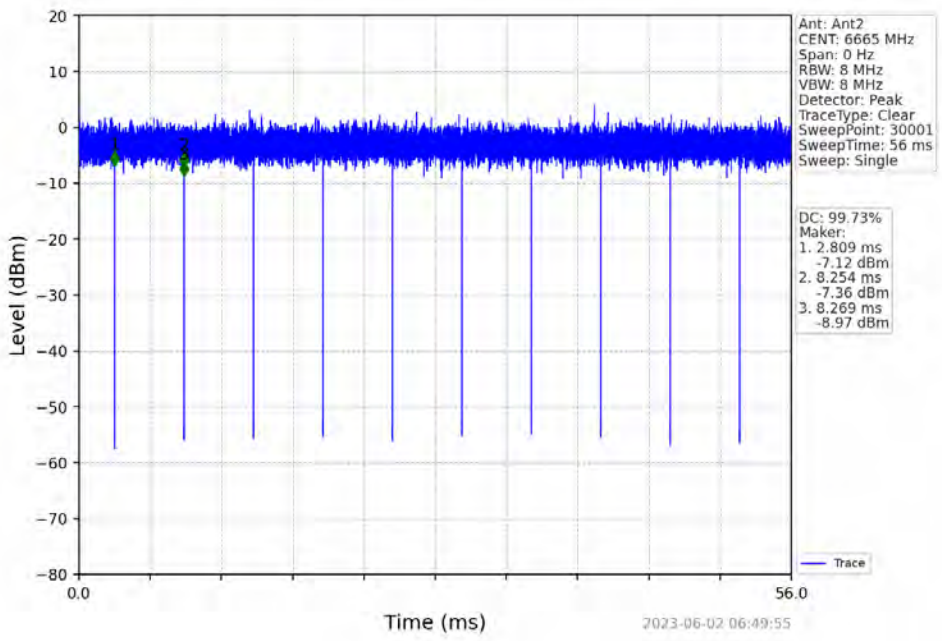

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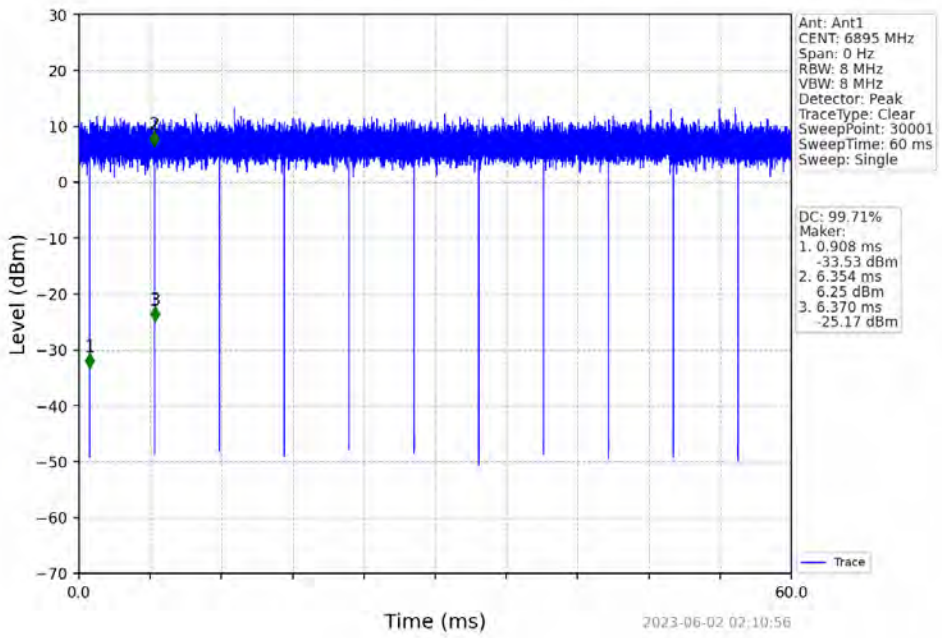

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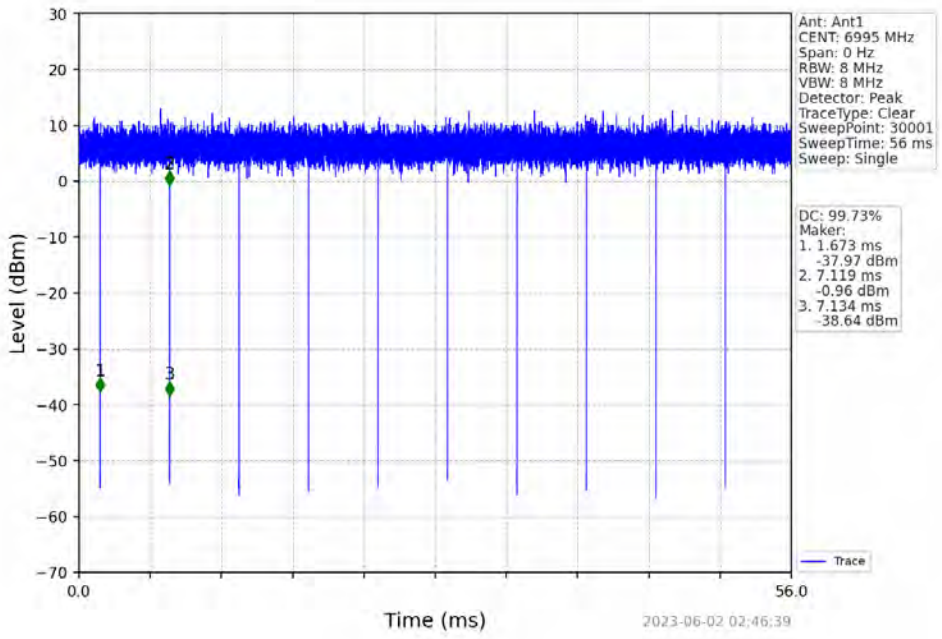

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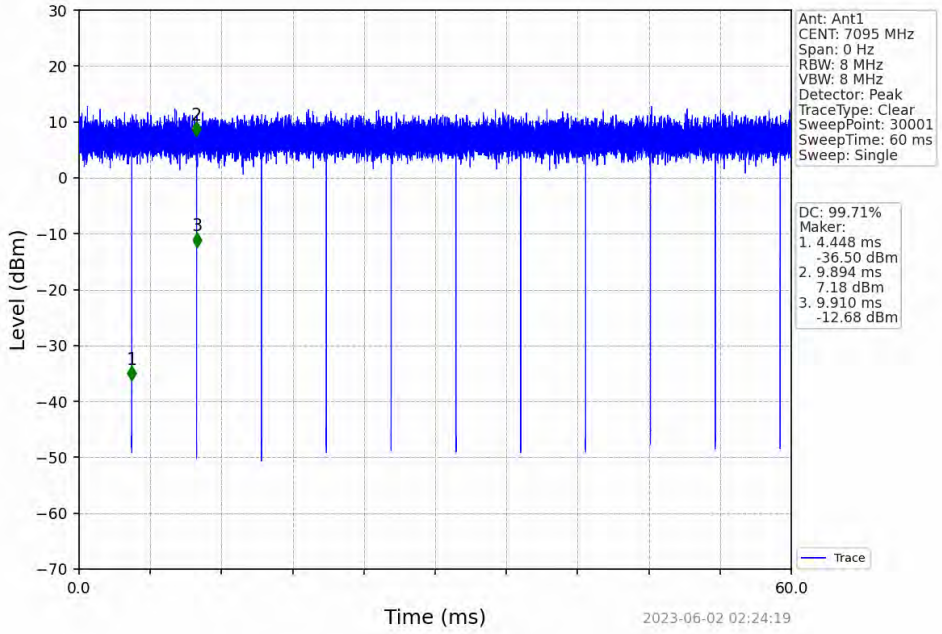

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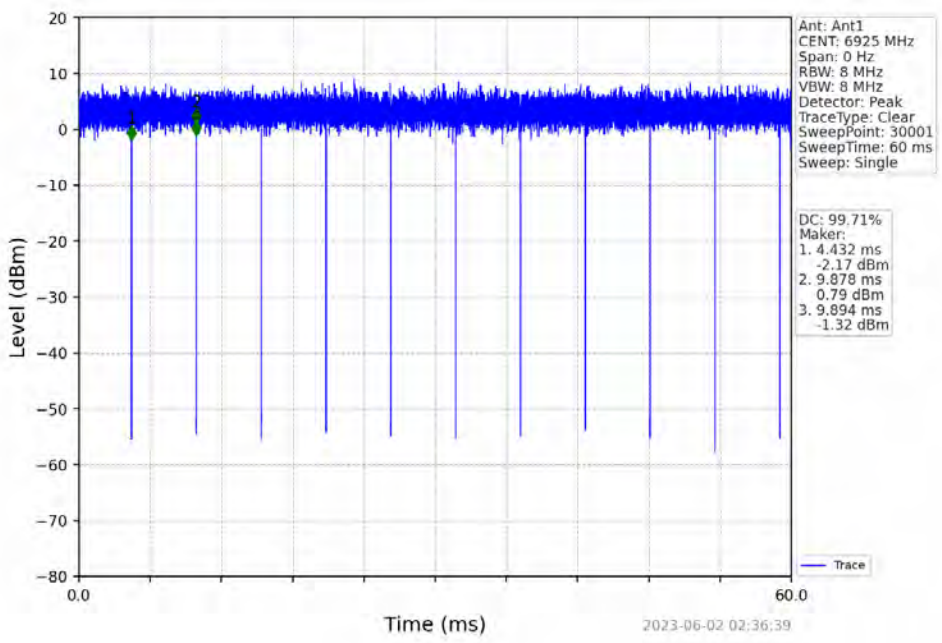

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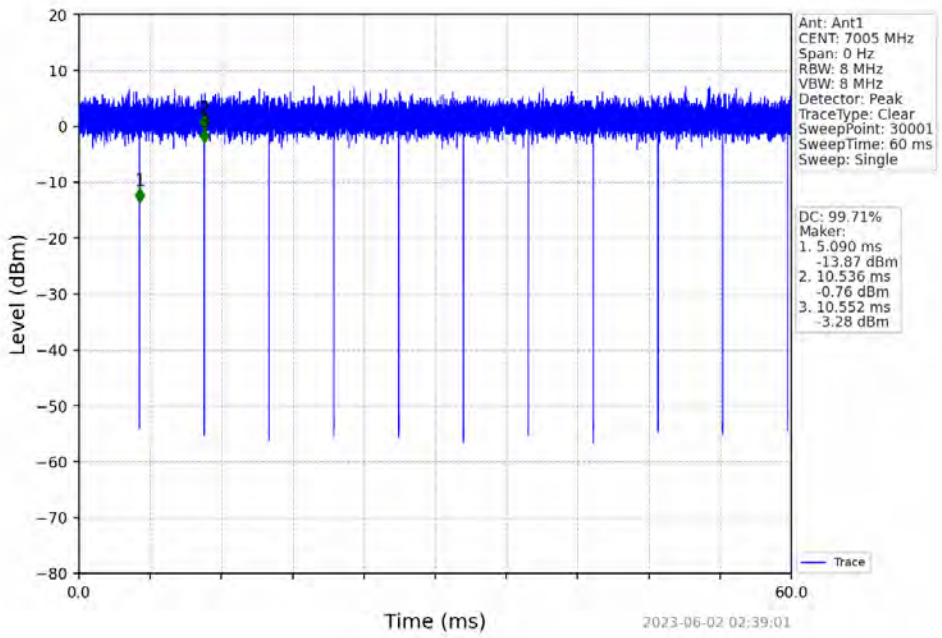

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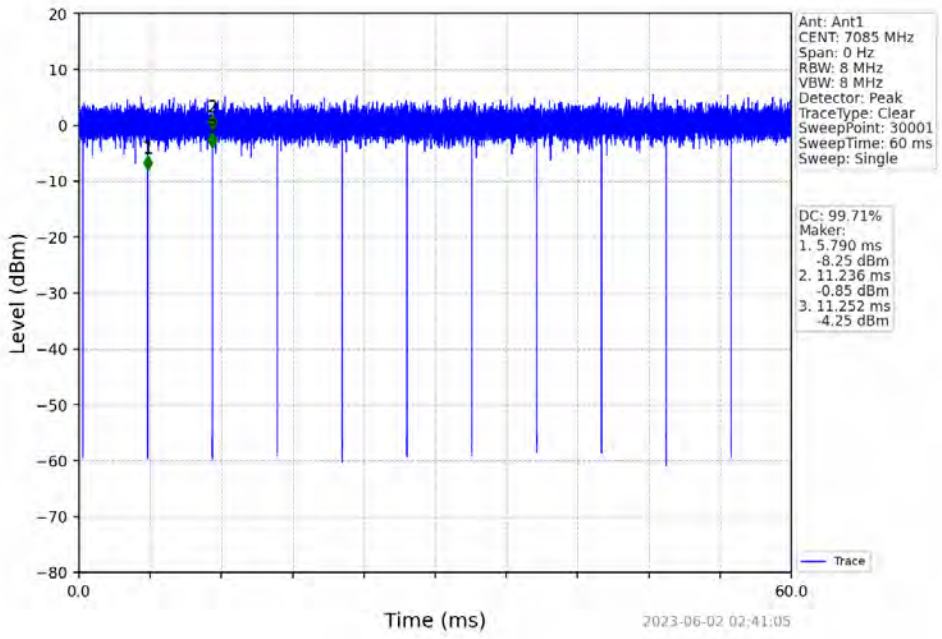

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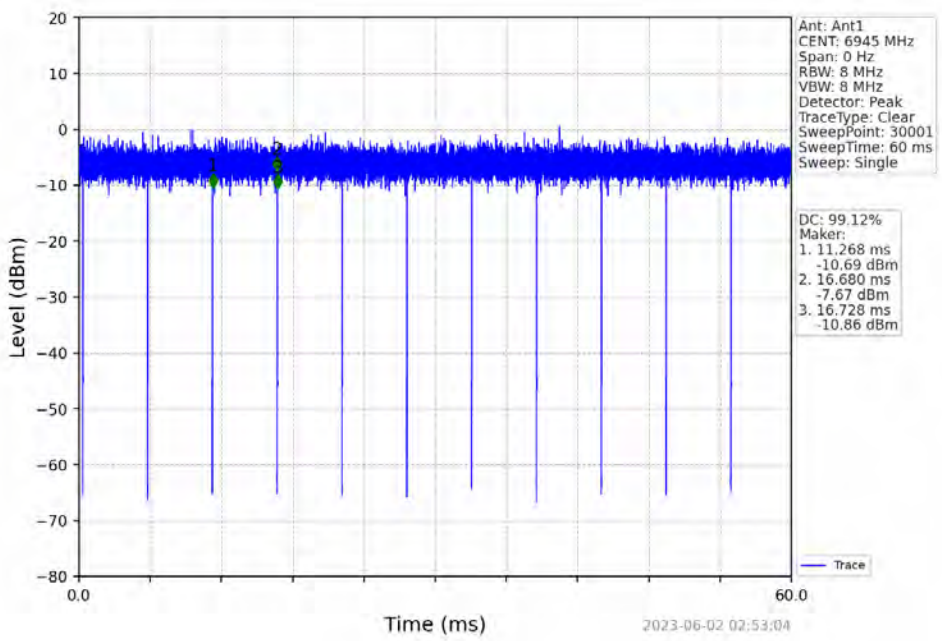

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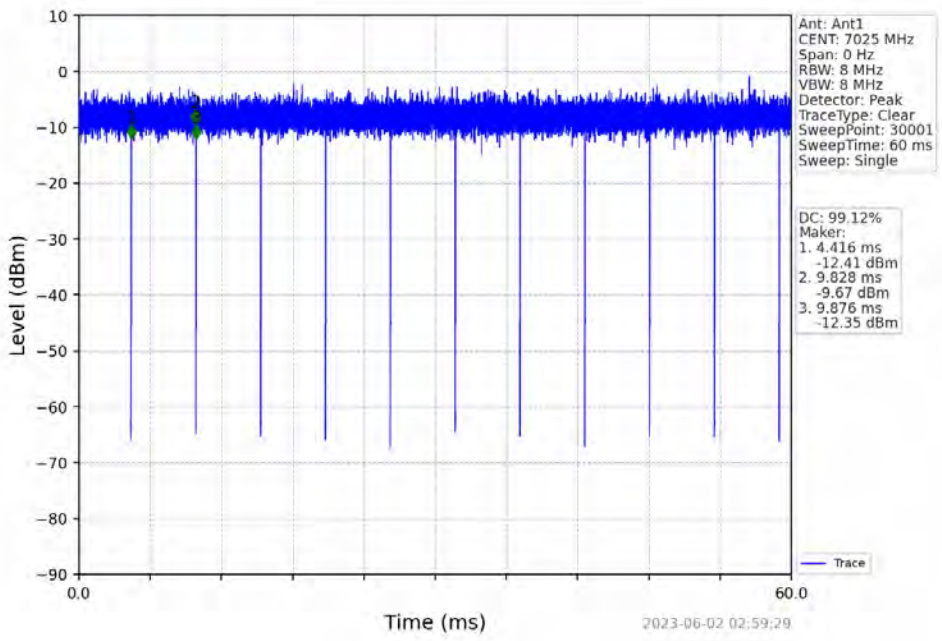

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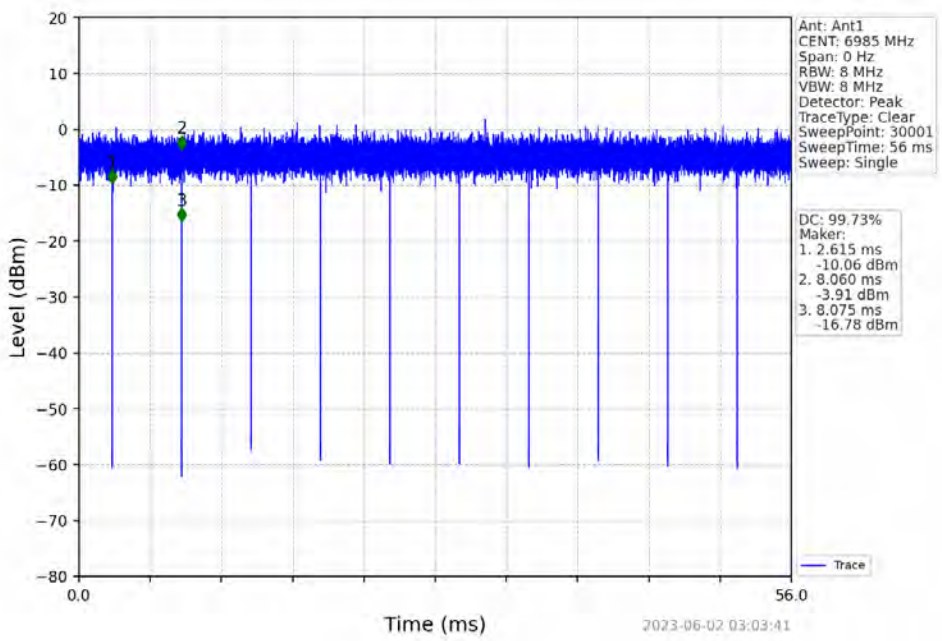

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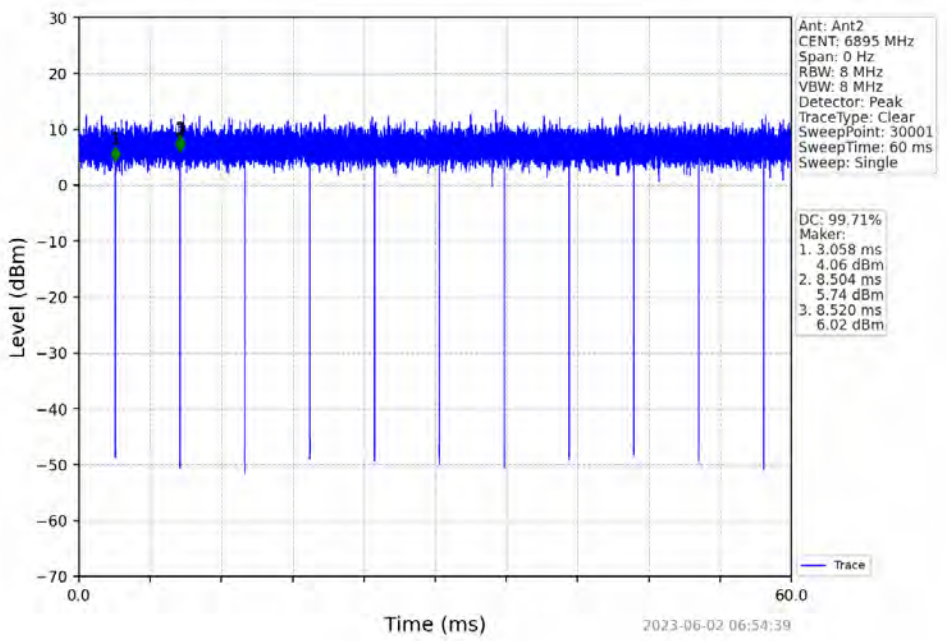

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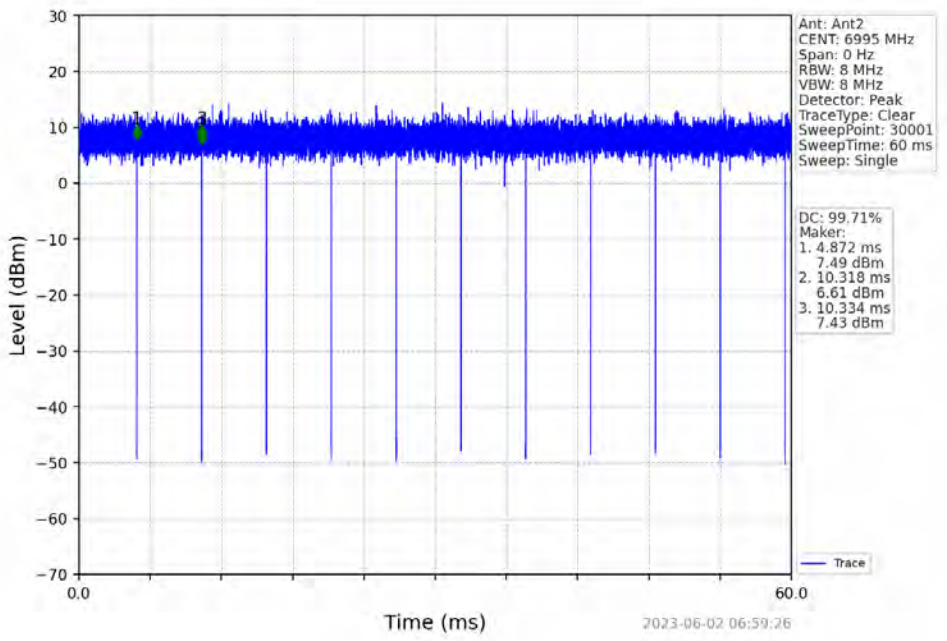

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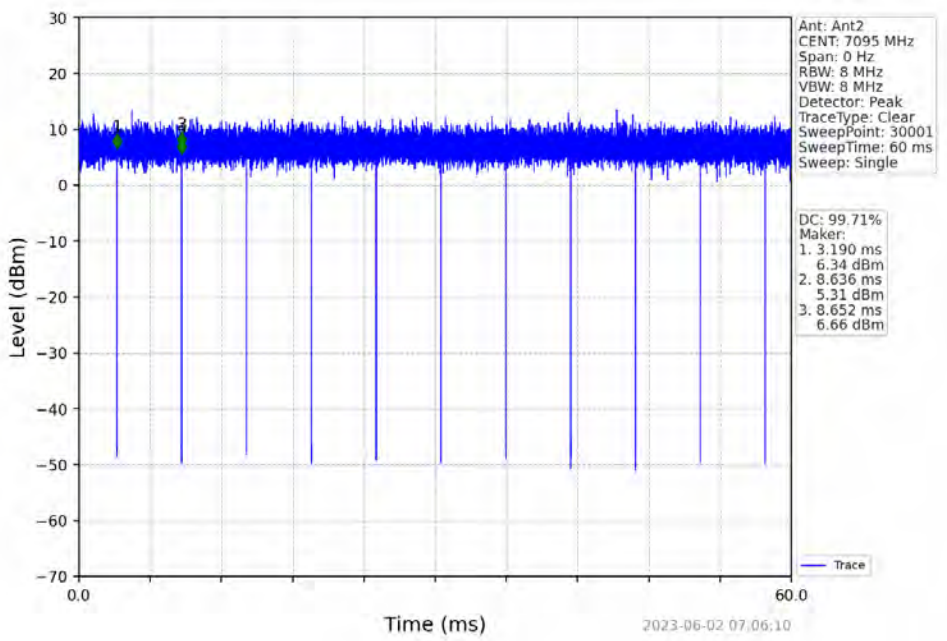

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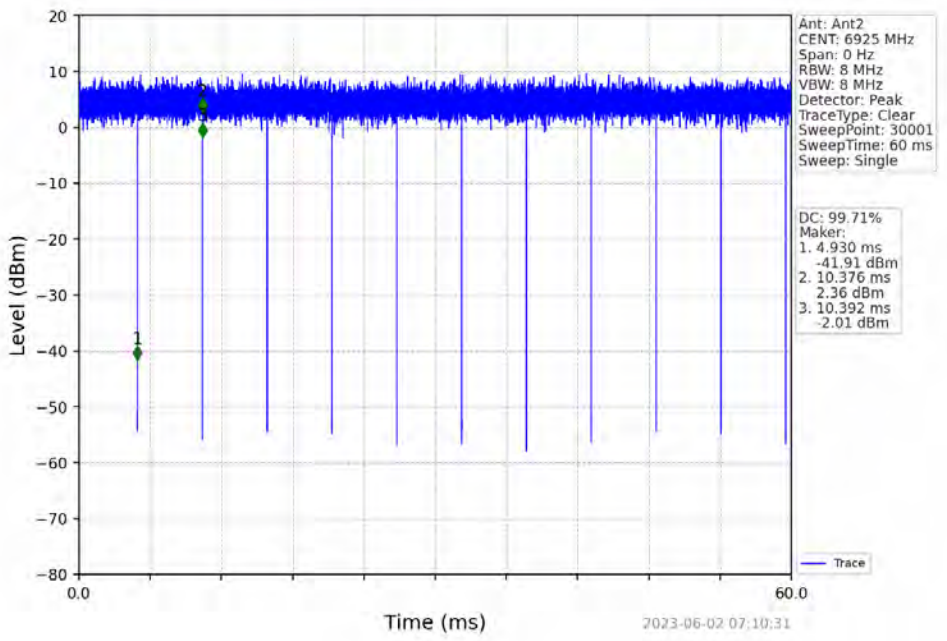

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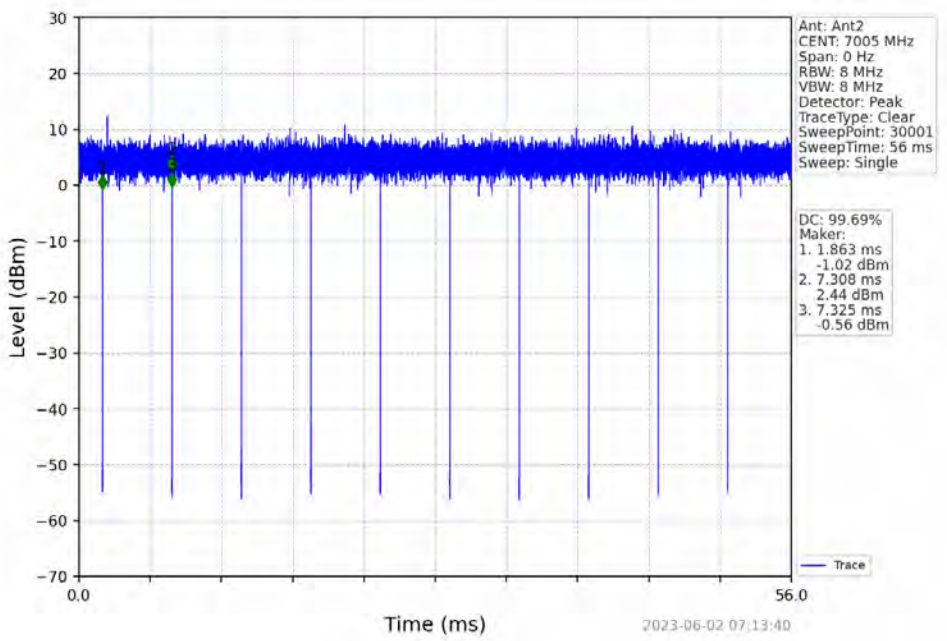

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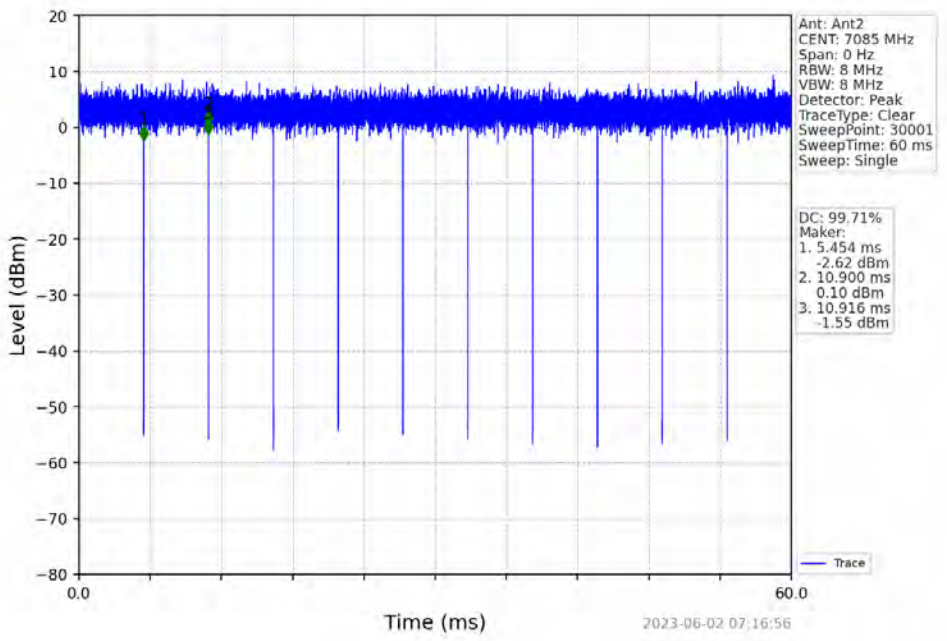

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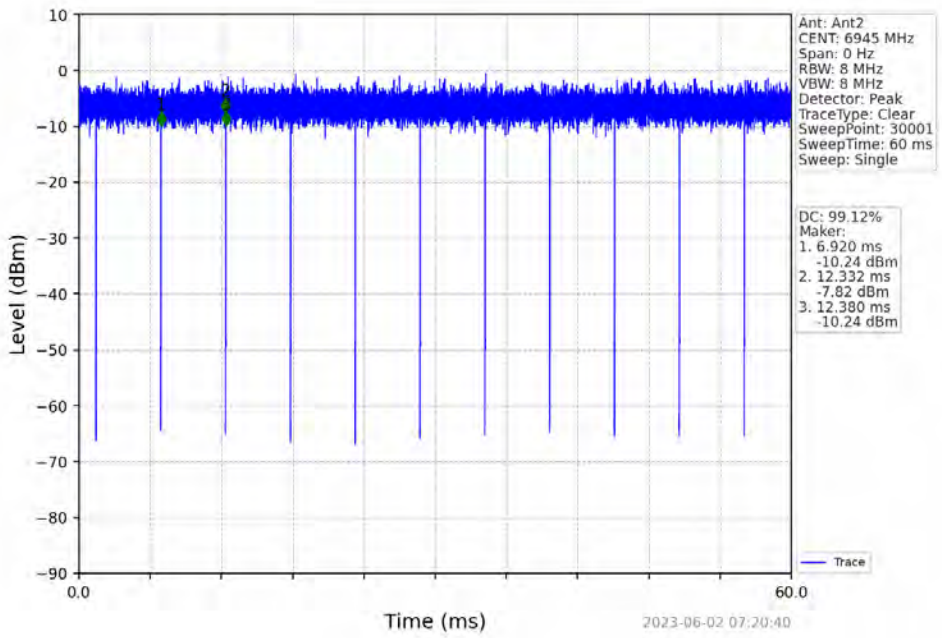

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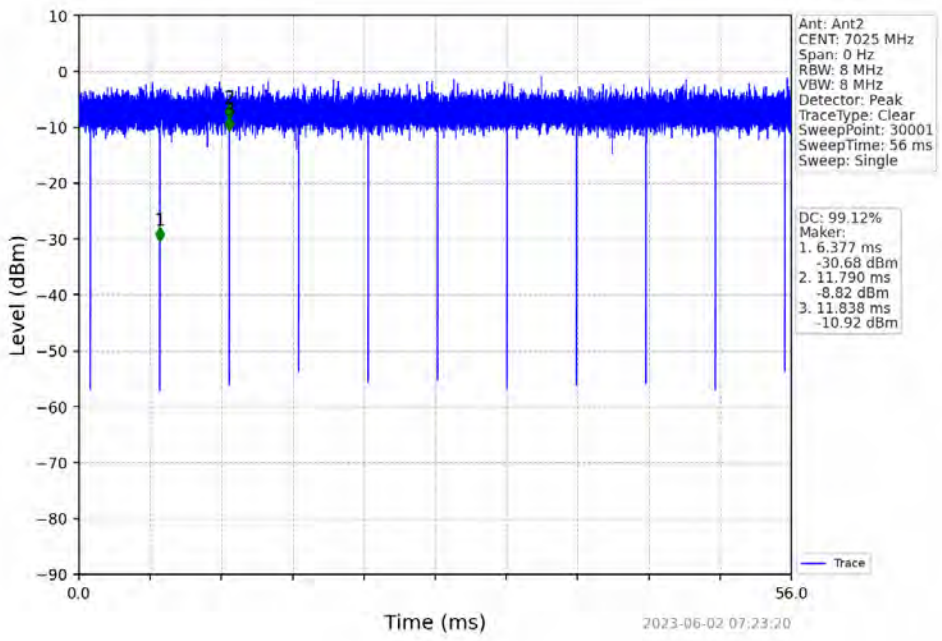

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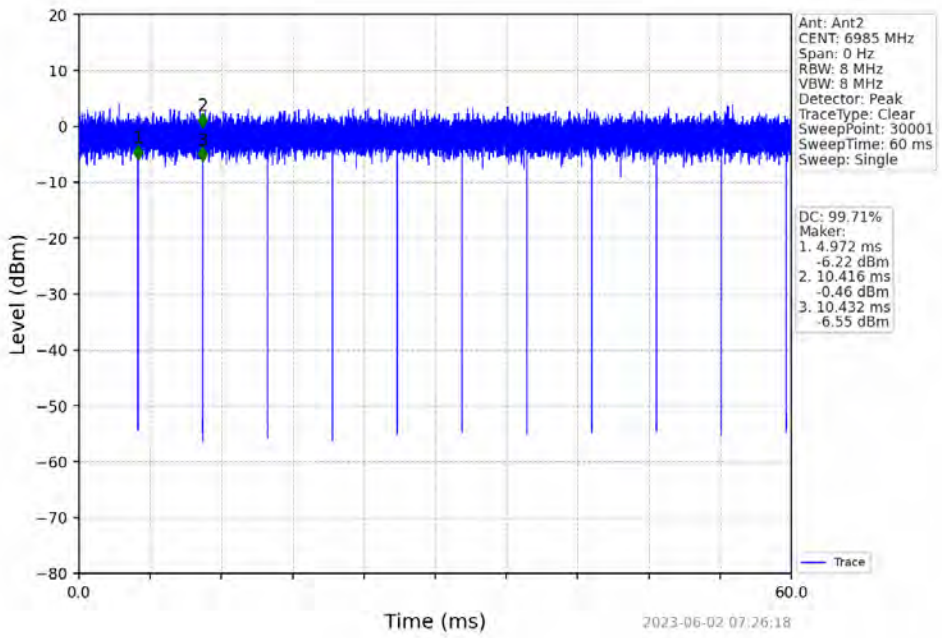

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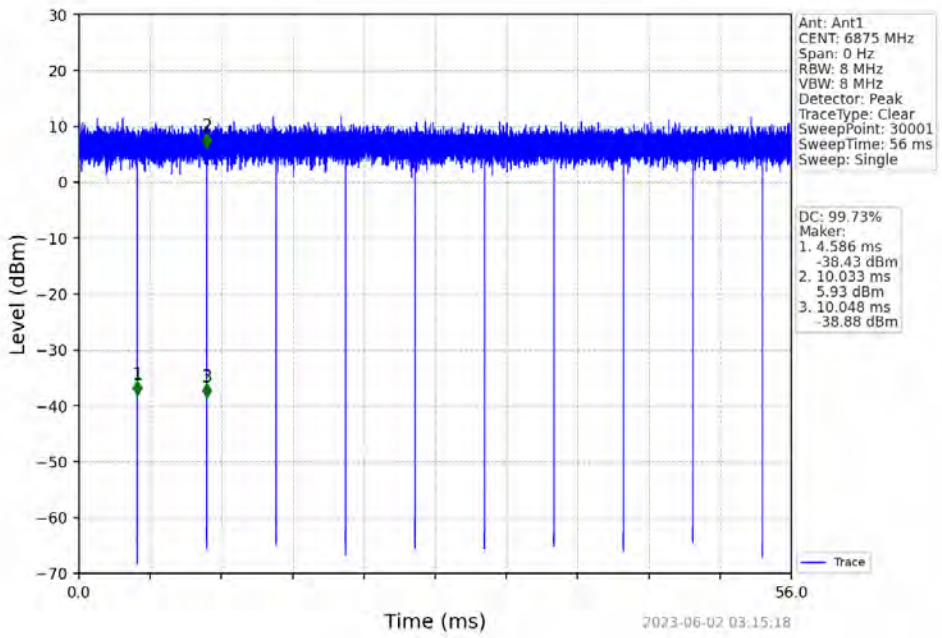
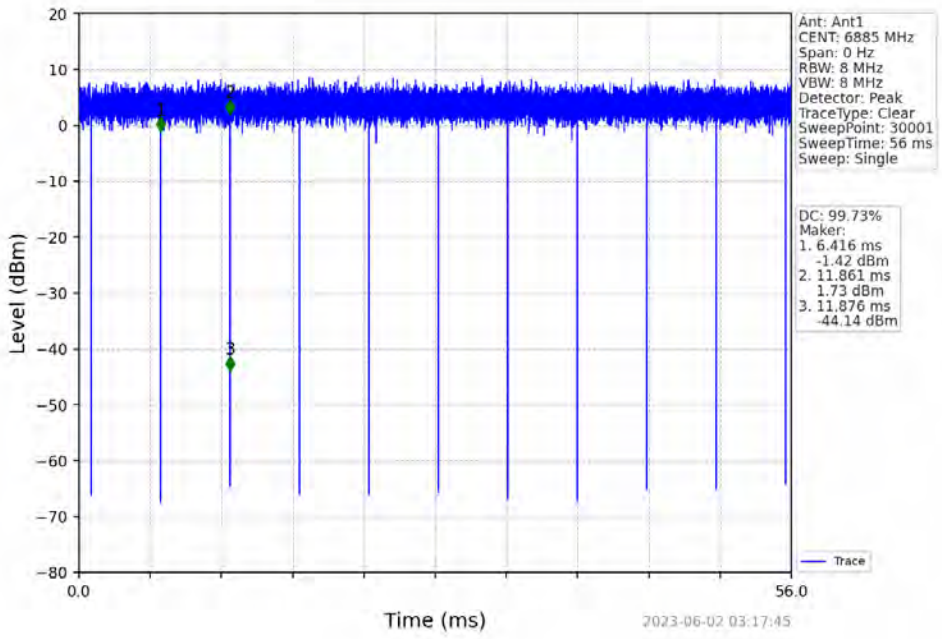


802.11ax(HEW40)_HCH_6885MHz_SU_Ant1_NTNV



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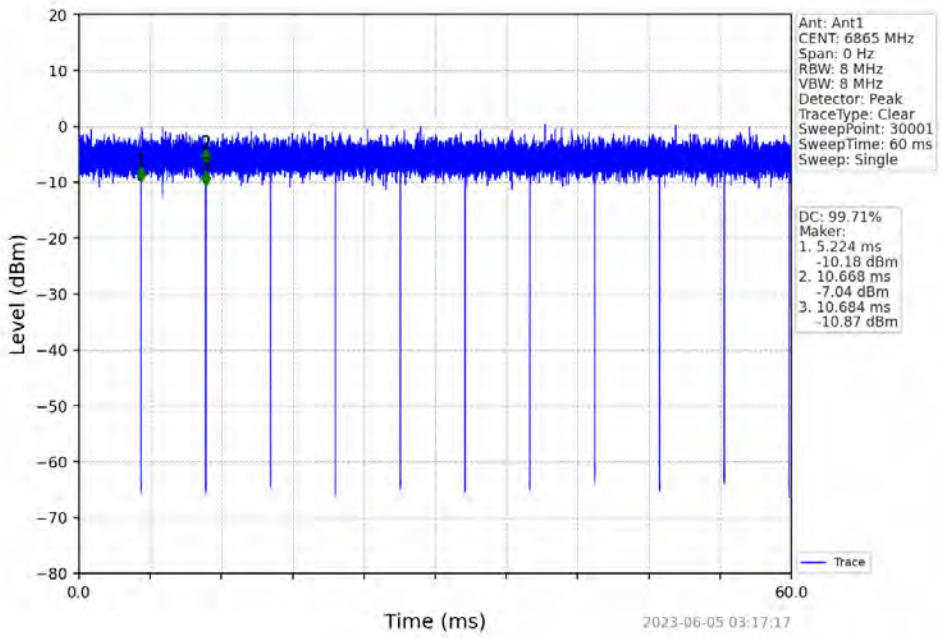
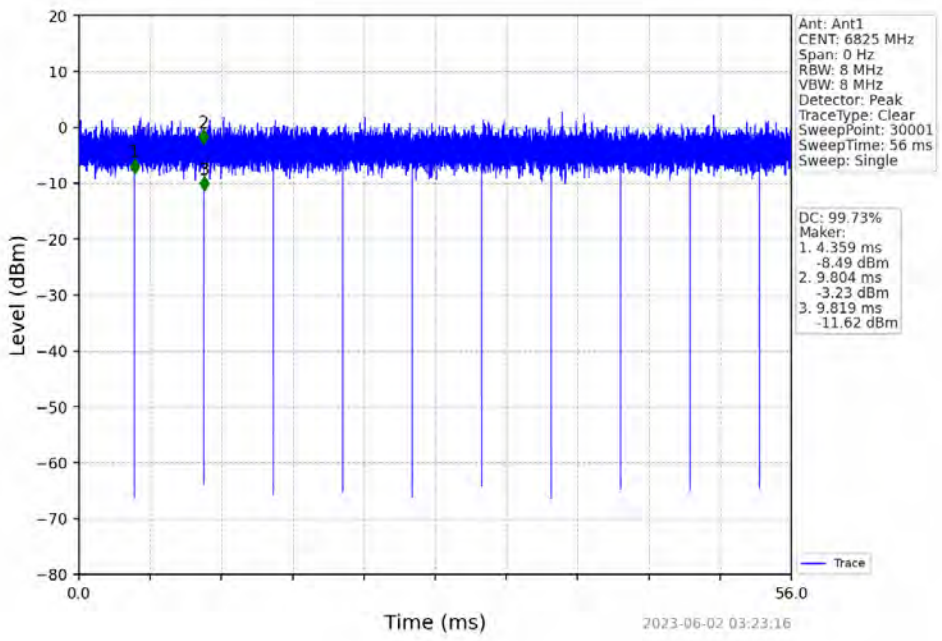


802.11ax(HEW160)_HCH_6825MHz_SU_Ant1_NTNV



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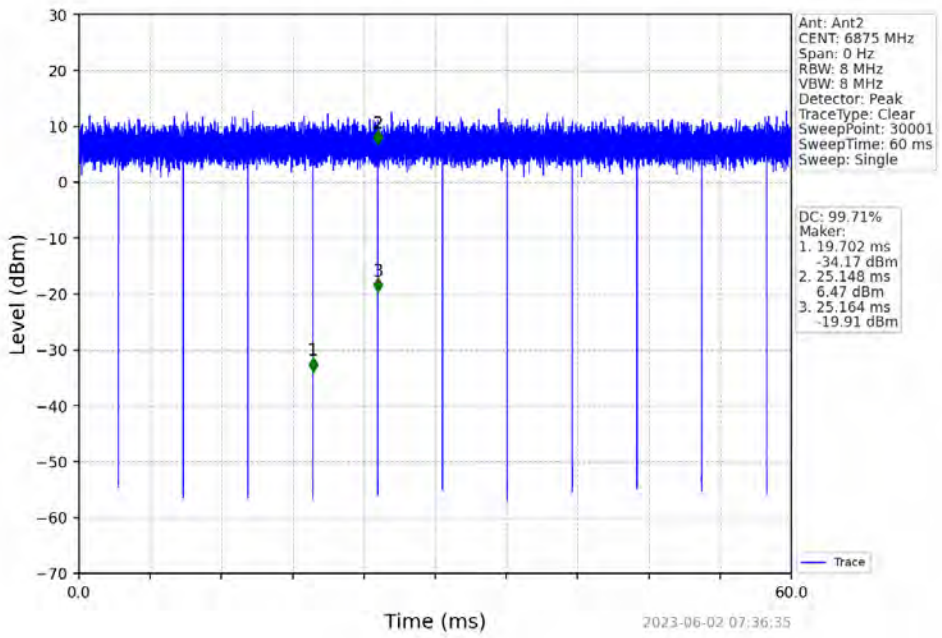

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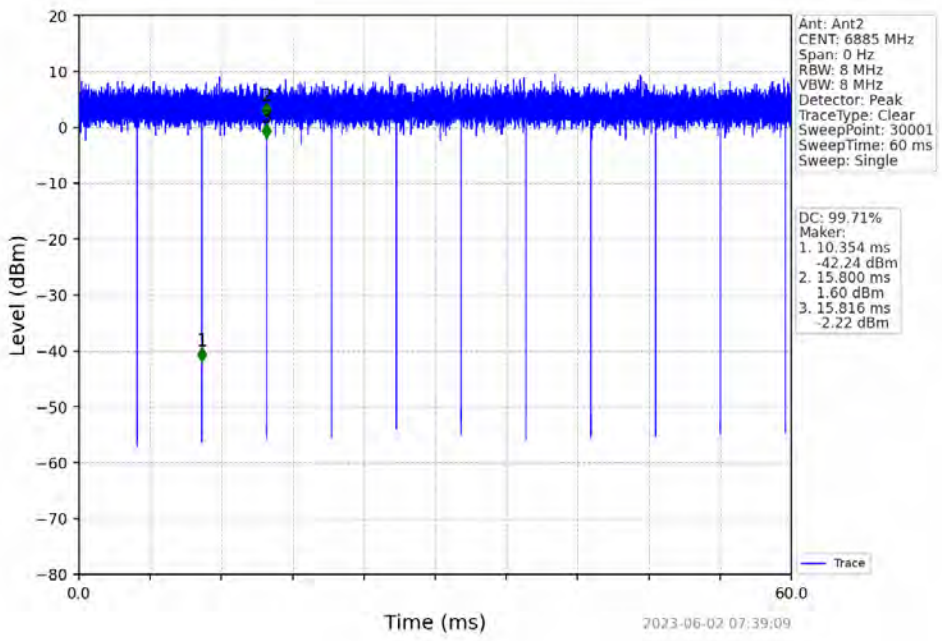

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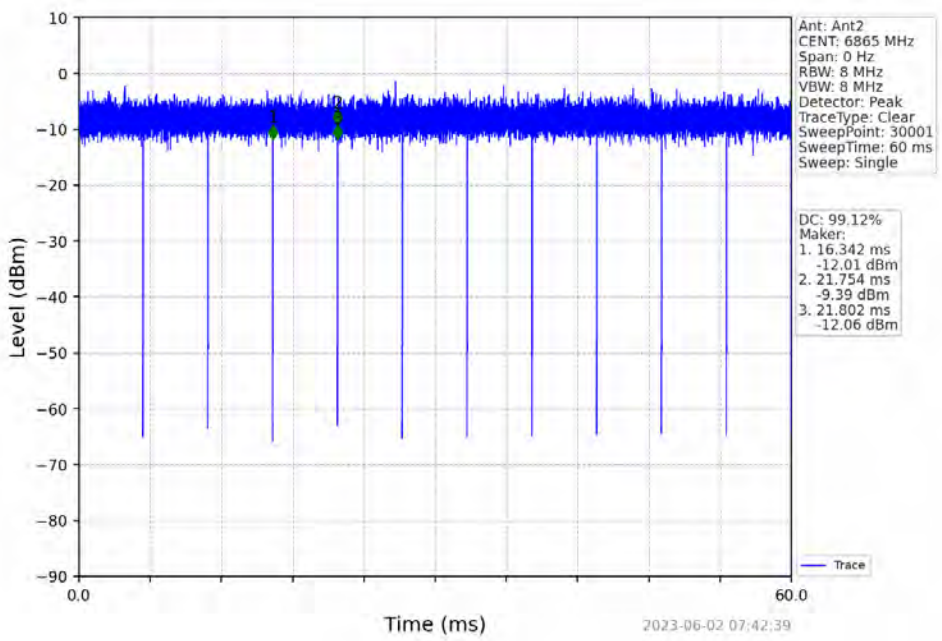

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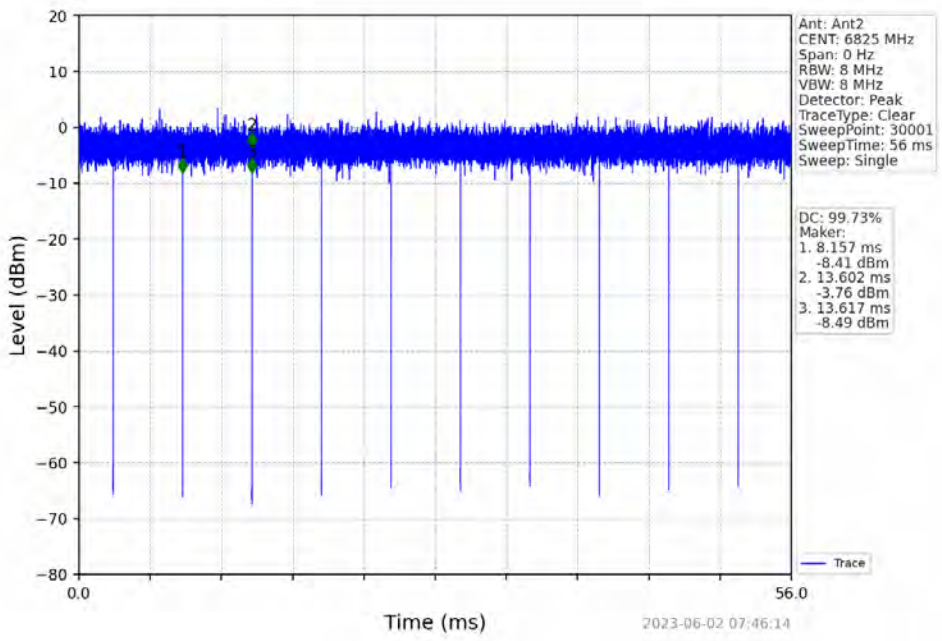

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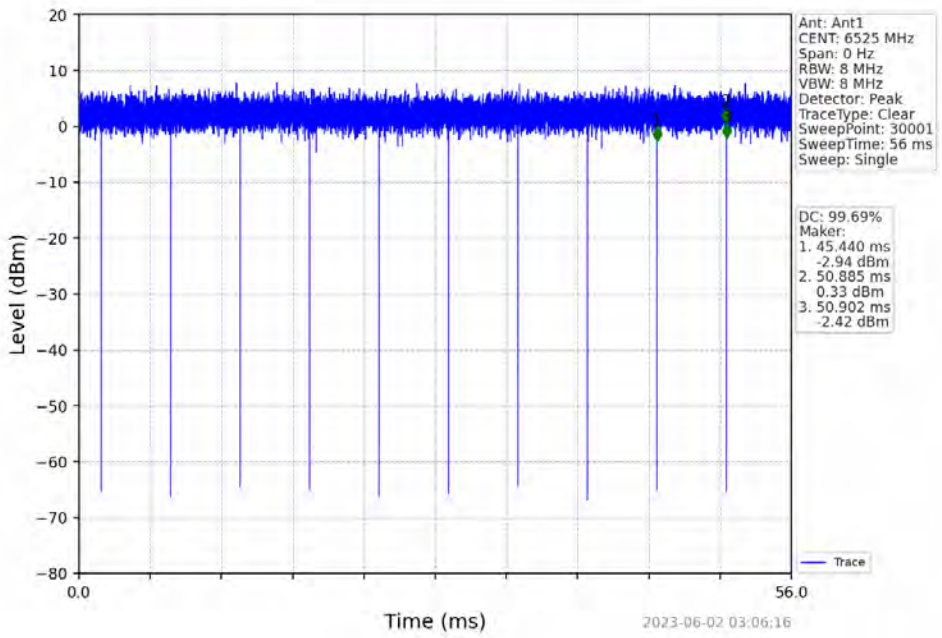

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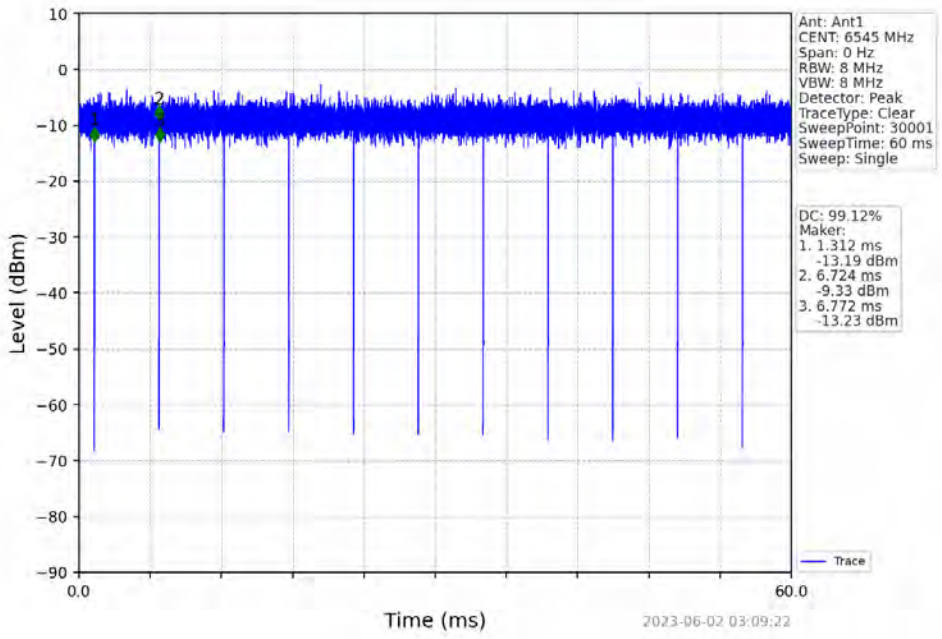

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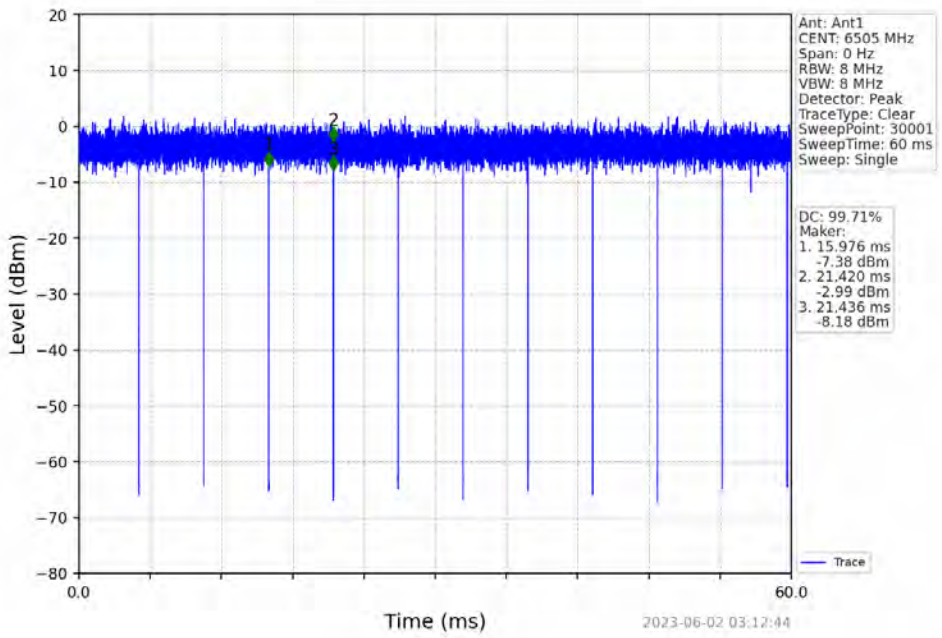
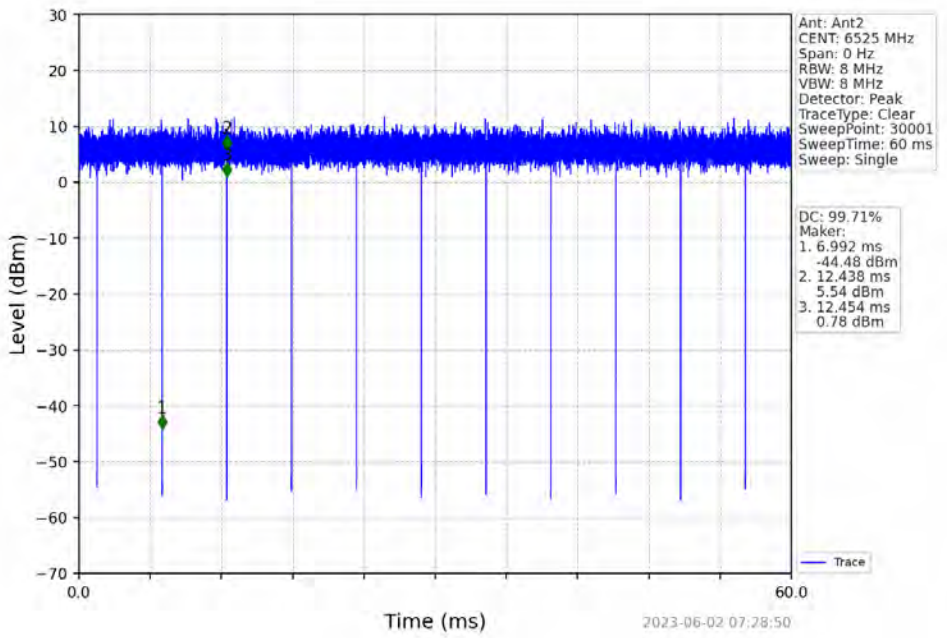


802.11ax(HEW40)_HCH_6525MHz_SU_Ant2_NTNV



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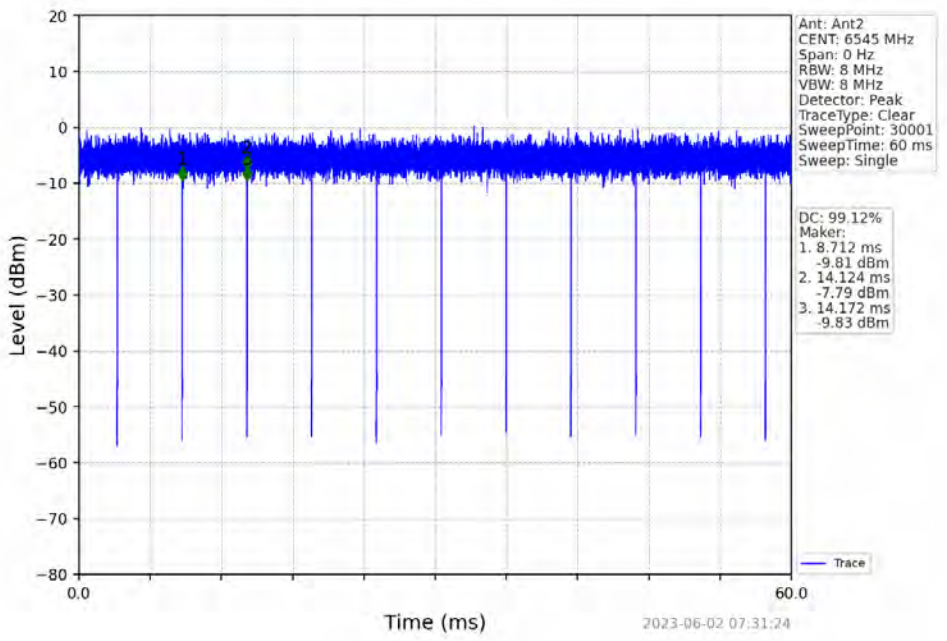

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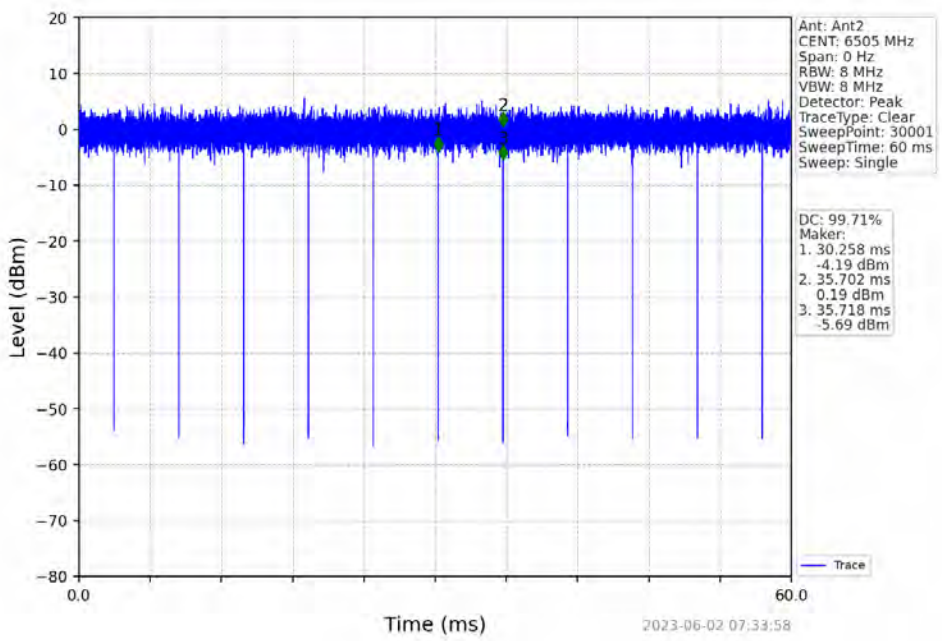


5.2. BANDWIDTH

5.2.1 OBW

Test Result

ENV	Mode	Frequency (MHz)	RU	ANT	99% Occupied Bandwidth (MHz)		Verdict
					Result	Limit	
NTNV	802.11ax (HEW20)	5955	SU	1	19.075	<=320	Pass
				2	19.119	<=320	Pass
		6175	SU	1	19.131	<=320	Pass
				2	19.108	<=320	Pass
		6415	SU	1	19.063	<=320	Pass
				2	19.118	<=320	Pass
	802.11ax (HEW40)	5965	SU	1	37.944	<=320	Pass
				2	38.119	<=320	Pass
		6165	SU	1	37.859	<=320	Pass
				2	37.979	<=320	Pass
		6405	SU	1	37.926	<=320	Pass
				2	37.975	<=320	Pass
	802.11ax (HEW80)	5985	SU	1	77.810	<=320	Pass
				2	77.562	<=320	Pass
		6145	SU	1	77.472	<=320	Pass
				2	77.547	<=320	Pass
		6385	SU	1	77.574	<=320	Pass
				2	77.630	<=320	Pass
	802.11ax (HEW160)	6025	SU	1	157.007	<=320	Pass
				2	156.515	<=320	Pass
		6185	SU	1	156.338	<=320	Pass
				2	156.393	<=320	Pass
		6345	SU	1	156.220	<=320	Pass
				2	156.748	<=320	Pass

ENV	Mode	Frequency (MHz)	RU	ANT	99% Occupied Bandwidth (MHz)		Verdict
					Result	Limit	
NTNV	802.11ax (HEW20)	6435	SU	1	19.144	<=320	Pass
				2	19.105	<=320	Pass
		6475	SU	1	19.137	<=320	Pass
				2	19.116	<=320	Pass
		6515	SU	1	19.081	<=320	Pass
				2	19.058	<=320	Pass
	802.11ax (HEW40)	6445	SU	1	38.009	<=320	Pass
				2	37.929	<=320	Pass
		6485	SU	1	37.946	<=320	Pass
				2	37.967	<=320	Pass
	802.11ax (HEW80)	6465	SU	1	77.428	<=320	Pass
				2	77.654	<=320	Pass

ENV	Mode	Frequency (MHz)	RU	ANT	99% Occupied Bandwidth (MHz)		Verdict
					Result	Limit	
NTNV	802.11ax (HEW20)	6535	SU	1	19.119	<=320	Pass
				2	19.106	<=320	Pass

		6695	SU	1	19.103	<=320	Pass
				2	19.140	<=320	Pass
		6855	SU	1	19.082	<=320	Pass
				2	19.091	<=320	Pass
	802.11ax (HEW40)	6565	SU	1	37.986	<=320	Pass
				2	37.956	<=320	Pass
		6685	SU	1	38.097	<=320	Pass
				2	37.942	<=320	Pass
		6845	SU	1	37.962	<=320	Pass
				2	38.000	<=320	Pass
	802.11ax (HEW80)	6625	SU	1	77.596	<=320	Pass
				2	77.601	<=320	Pass
		6705	SU	1	77.613	<=320	Pass
				2	77.567	<=320	Pass
		6785	SU	1	77.558	<=320	Pass
				2	77.521	<=320	Pass
	802.11ax (HEW160)	6665	SU	1	157.176	<=320	Pass
				2	156.972	<=320	Pass

ENV	Mode	Frequency (MHz)	RU	ANT	99% Occupied Bandwidth (MHz)		Verdict
					Result	Limit	
NTNV	802.11ax (HEW20)	6895	SU	1	19.118	<=320	Pass
				2	19.094	<=320	Pass
		6995	SU	1	19.148	<=320	Pass
				2	19.101	<=320	Pass
		7095	SU	1	19.139	<=320	Pass
				2	19.105	<=320	Pass
	802.11ax (HEW40)	6925	SU	1	38.098	<=320	Pass
				2	37.891	<=320	Pass
		7005	SU	1	37.878	<=320	Pass
				2	37.965	<=320	Pass
		7085	SU	1	37.986	<=320	Pass
				2	37.935	<=320	Pass
	802.11ax (HEW80)	6945	SU	1	77.714	<=320	Pass
				2	77.519	<=320	Pass
		7025	SU	1	77.615	<=320	Pass
				2	77.559	<=320	Pass
	802.11ax (HEW160)	6985	SU	1	156.698	<=320	Pass
				2	156.115	<=320	Pass

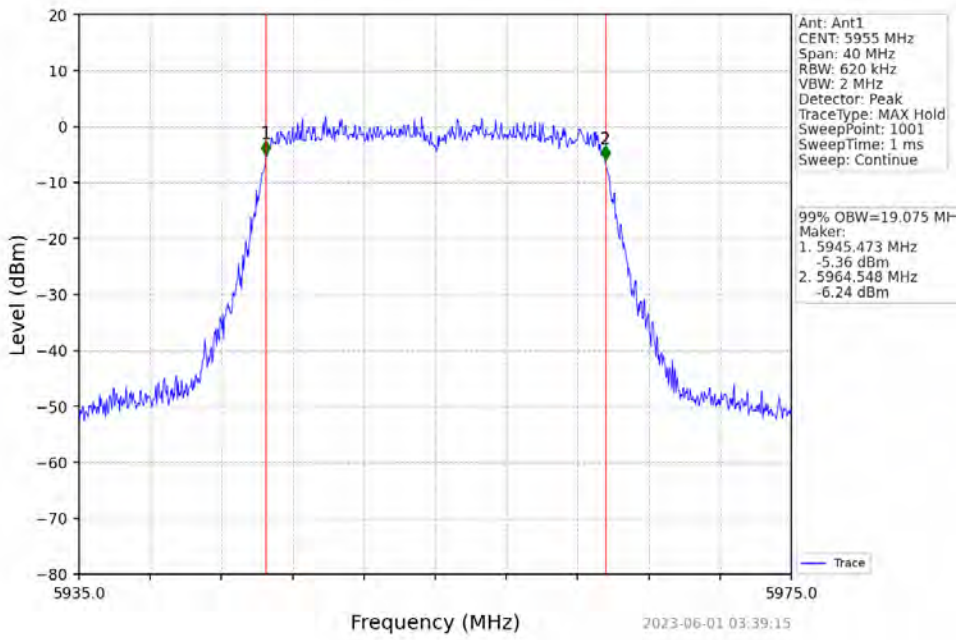
ENV	Mode	Frequency (MHz)	RU	ANT	99% Occupied Bandwidth (MHz)		Verdict
					Result	Limit	
NTNV	802.11ax (HEW20)	6875	SU	1	19.157	<=320	Pass
				2	19.087	<=320	Pass
	802.11ax (HEW40)	6885	SU	1	37.955	<=320	Pass
				2	37.962	<=320	Pass
	802.11ax (HEW80)	6865	SU	1	77.444	<=320	Pass
				2	77.764	<=320	Pass
	802.11ax (HEW160)	6825	SU	1	156.434	<=320	Pass
				2	157.023	<=320	Pass

ENV	Mode	Frequency (MHz)	RU	ANT	99% Occupied Bandwidth (MHz)	Verdict

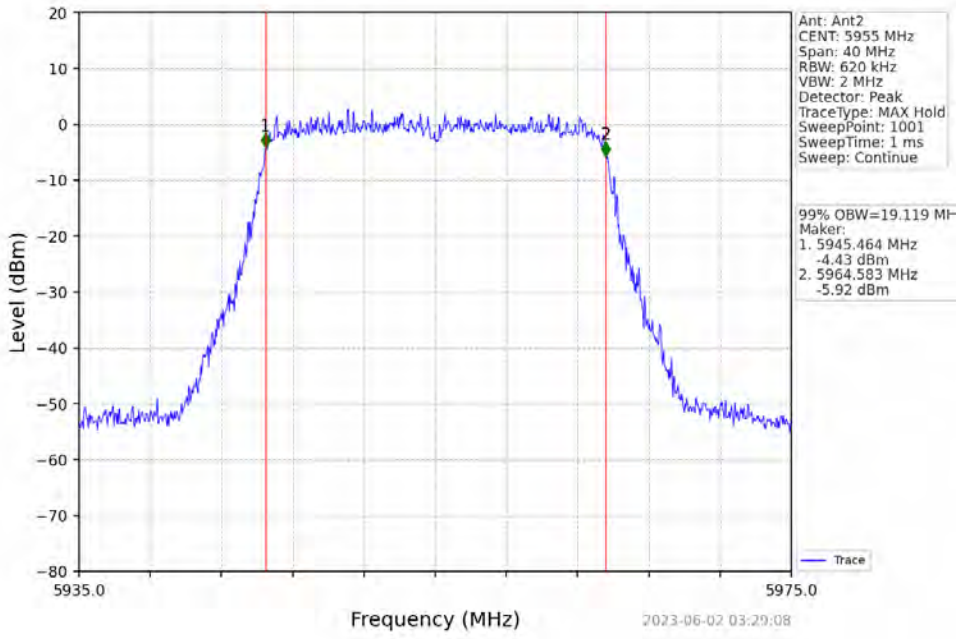
					Result	Limit	
NTNV	802.11ax (HEW40)	6525	SU	1	37.994	<=320	Pass
				2	37.992	<=320	Pass
	802.11ax (HEW80)	6545	SU	1	77.471	<=320	Pass
				2	77.452	<=320	Pass
	802.11ax (HEW160)	6505	SU	1	156.433	<=320	Pass
				2	156.347	<=320	Pass

Test Graph

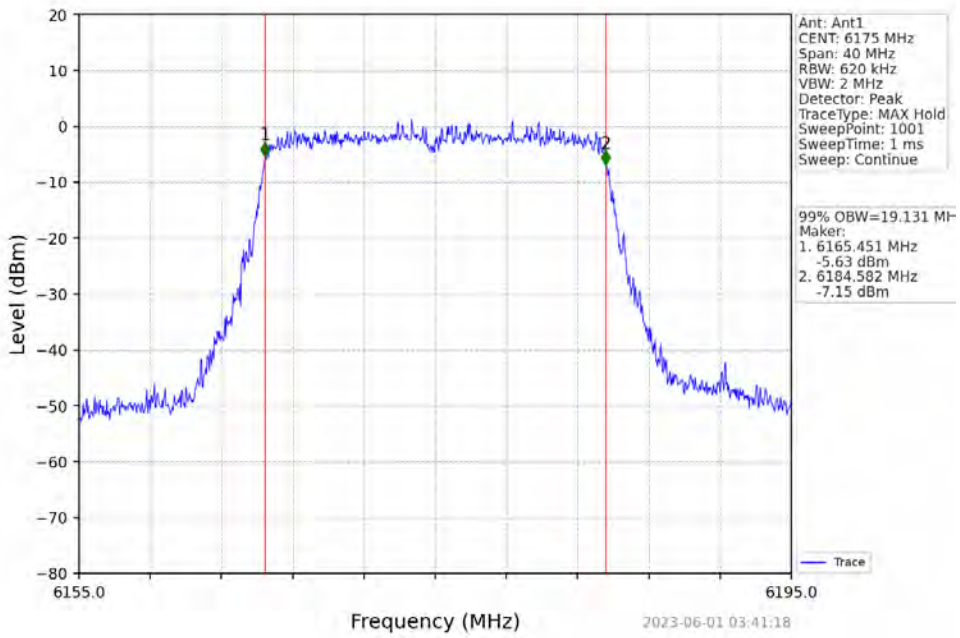
802.11ax(HEW20)_LCH_5955MHz_SU_Ant1_NTNV



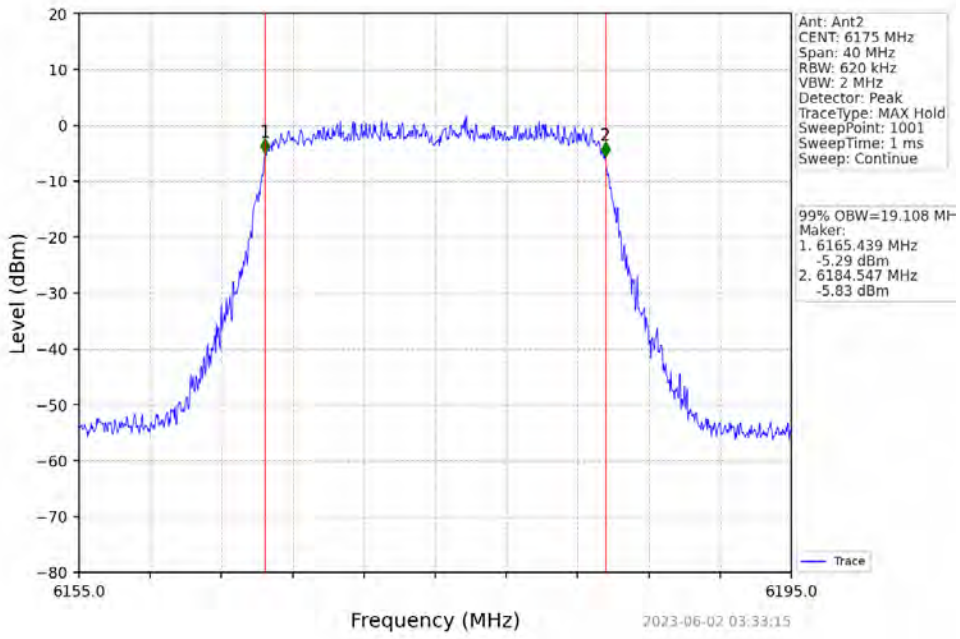
802.11ax(HEW20)_LCH_5955MHz_SU_Ant2_NTNV



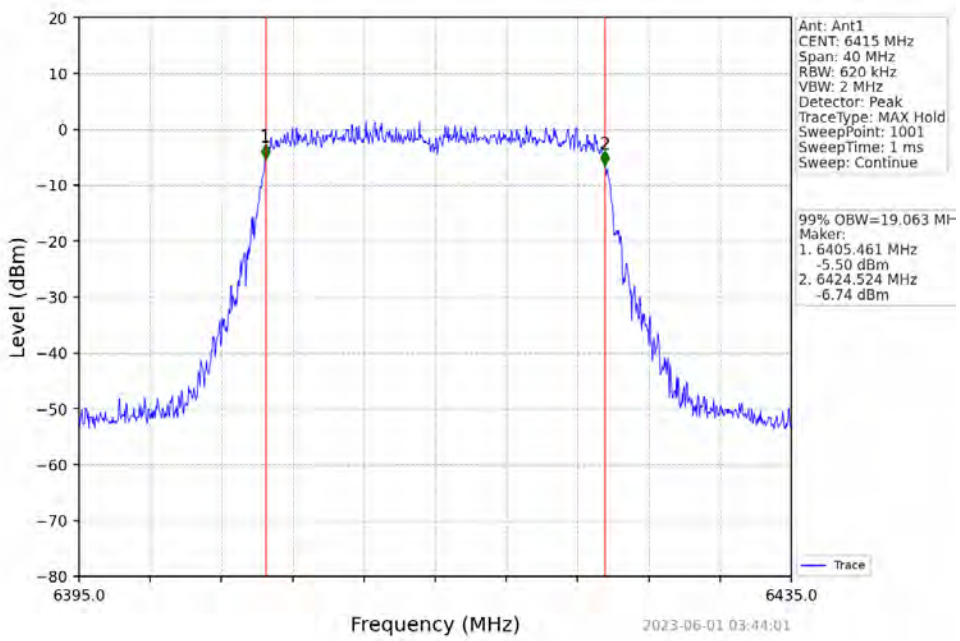
802.11ax(HEW20)_MCH_6175MHz_SU_Ant1_NTNV



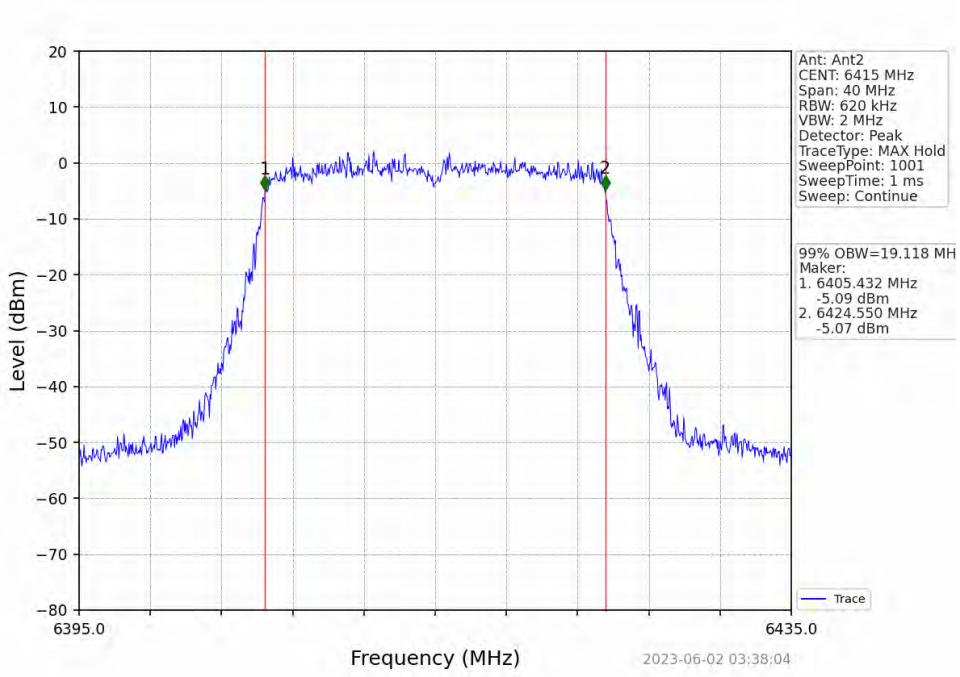
802.11ax(HEW20)_MCH_6175MHz_SU_Ant2_NTNV



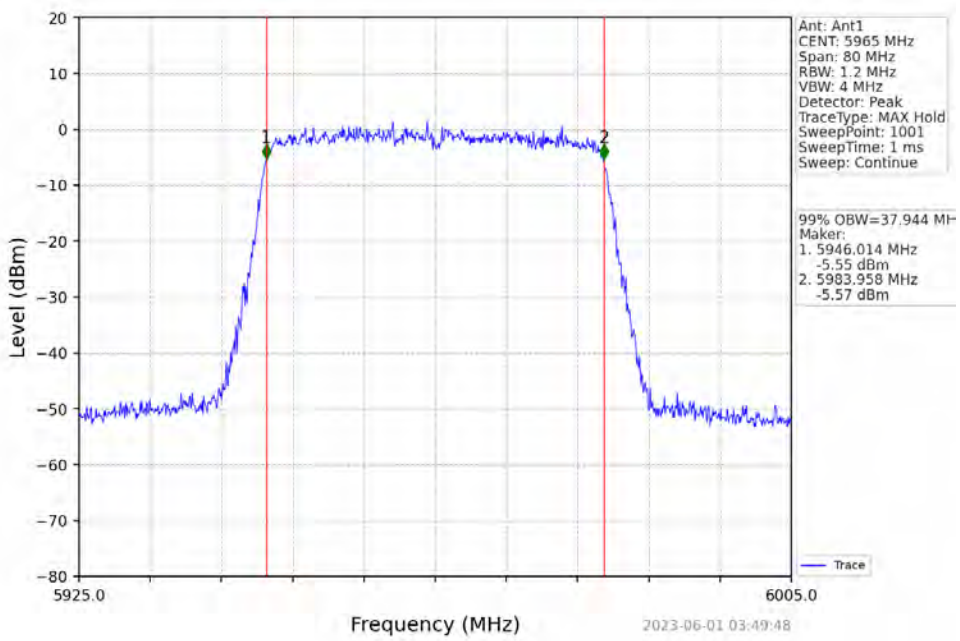
802.11ax(HEW20)_HCH_6415MHz_SU_Ant1_NTNV



802.11ax(HEW20)_HCH_6415MHz_SU_Ant2_NTNV



802.11ax(HEW40)_LCH_5965MHz_SU_Ant1_NTNV



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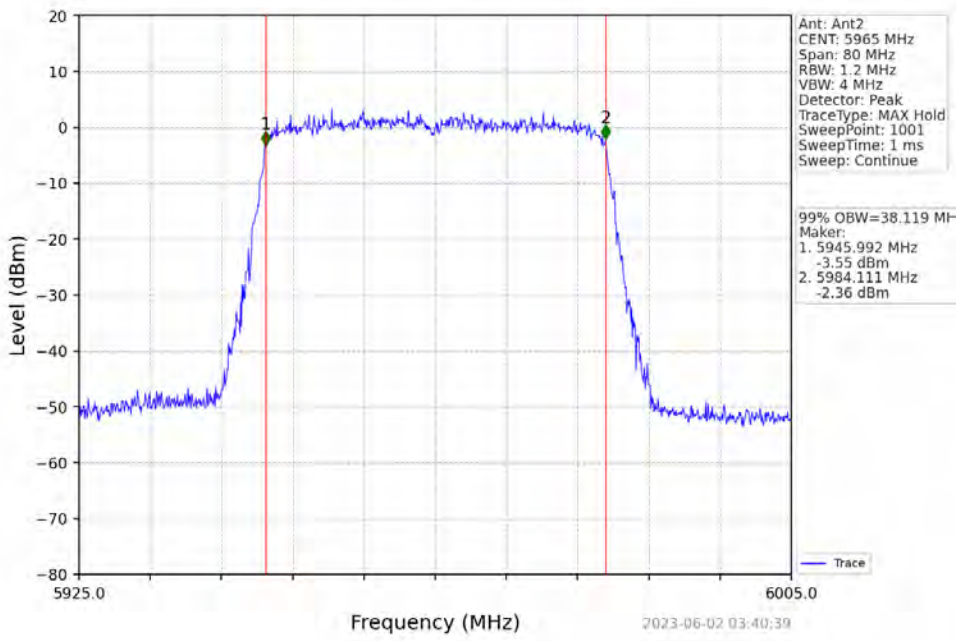

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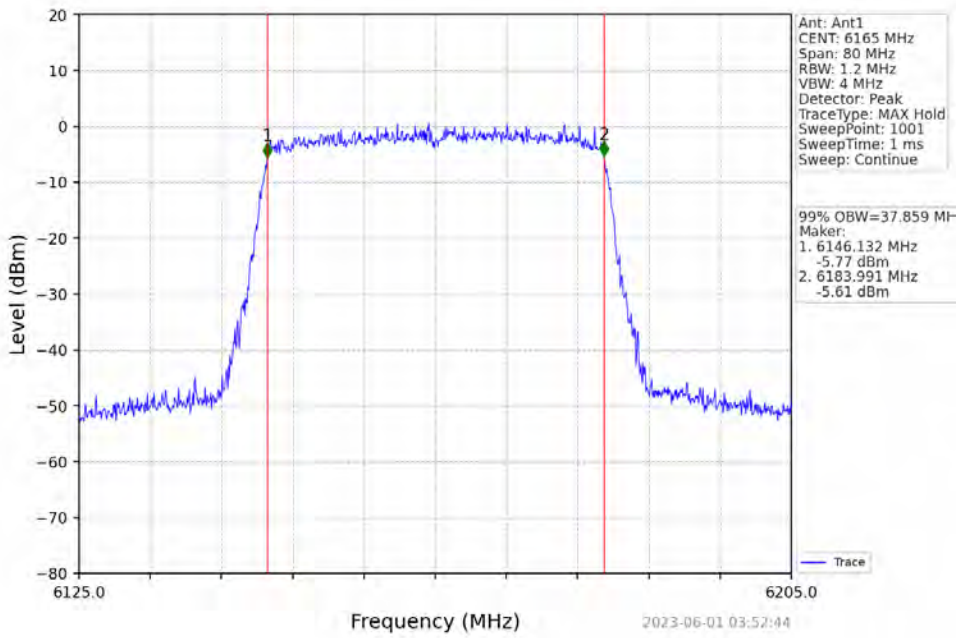

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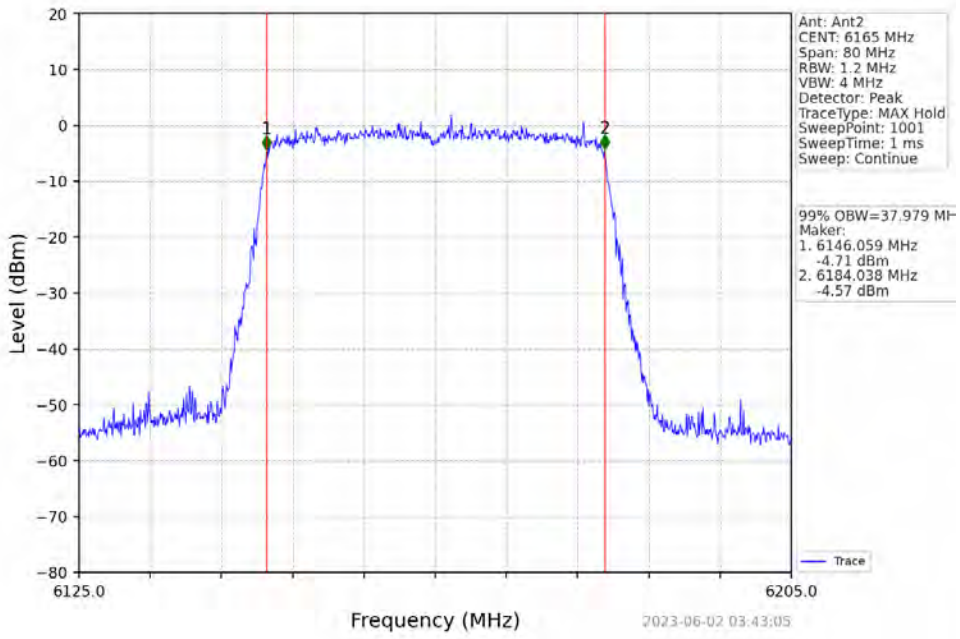
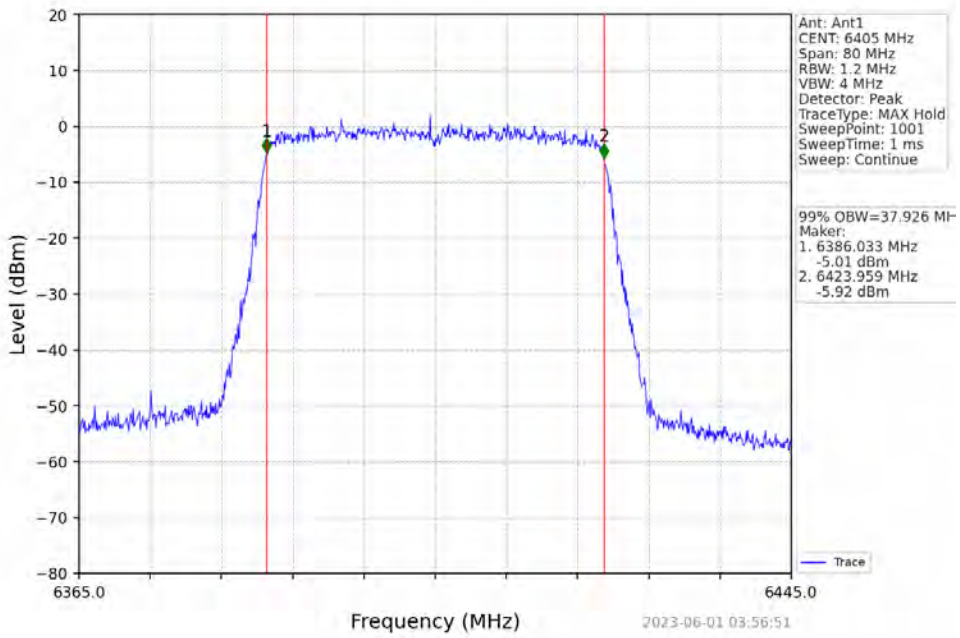


802.11ax(HEW40)_HCH_6405MHz_SU_Ant1_NTNV



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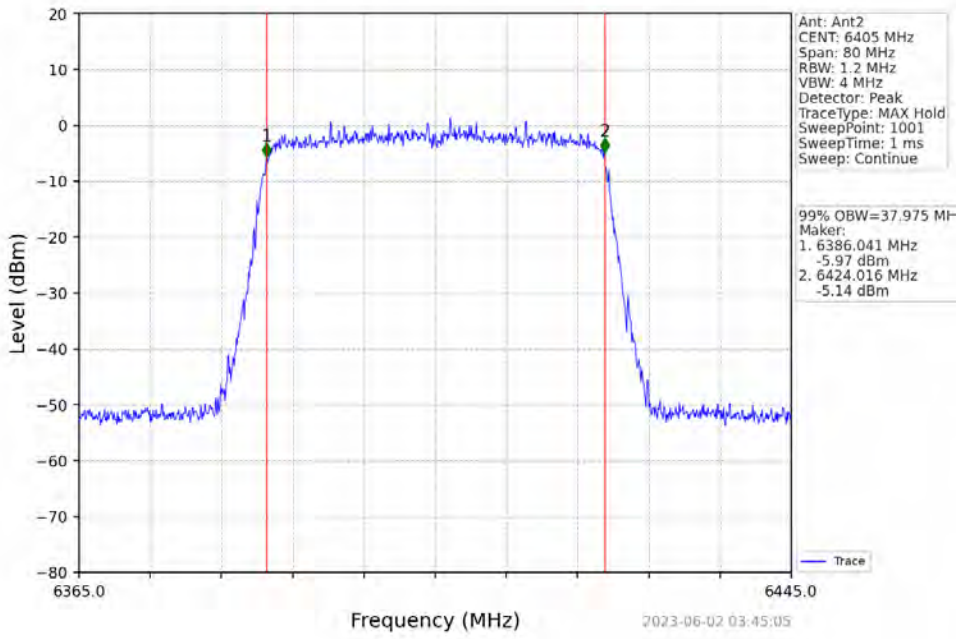
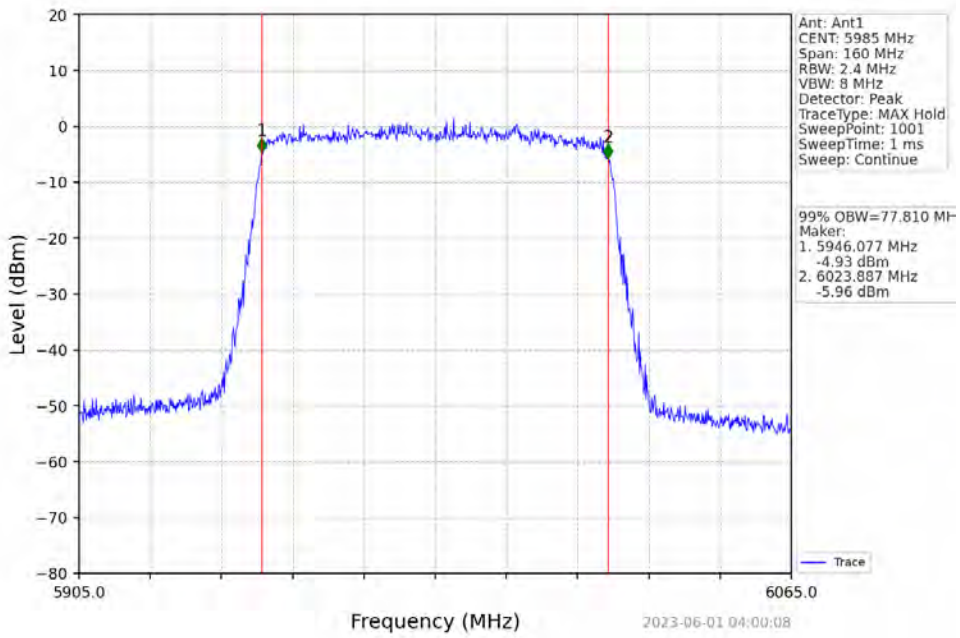
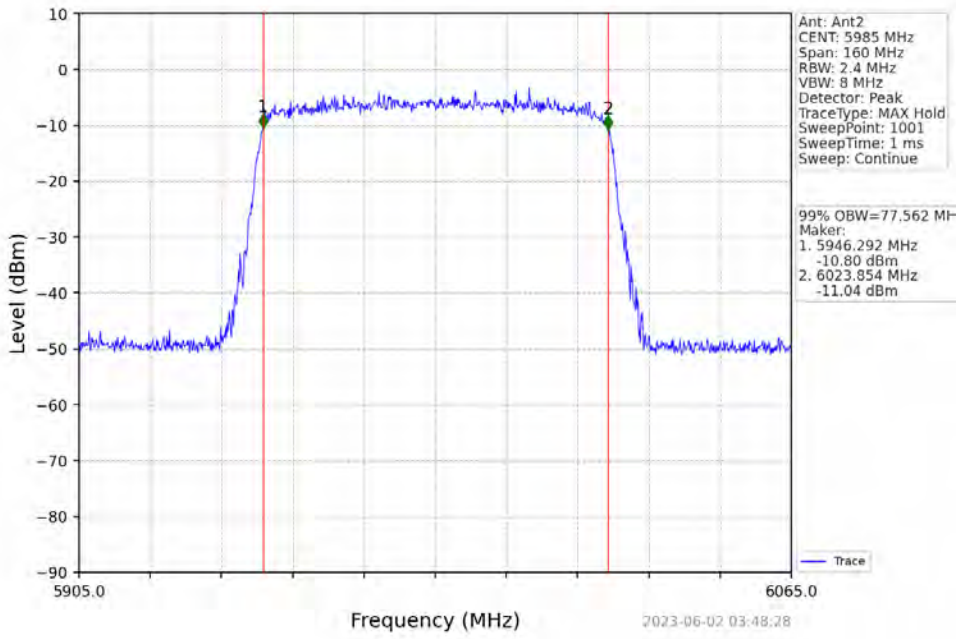


802.11ax(HEW80)_LCH_5985MHz_SU_Ant1_NTNV



802.11ax(HEW80)_LCH_5985MHz_SU_Ant2_NTNV



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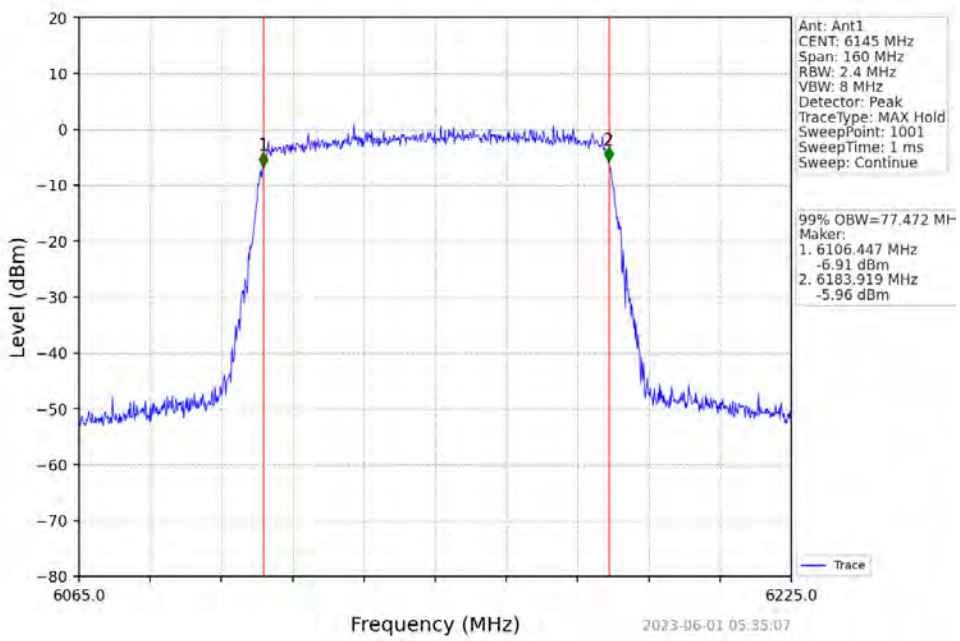

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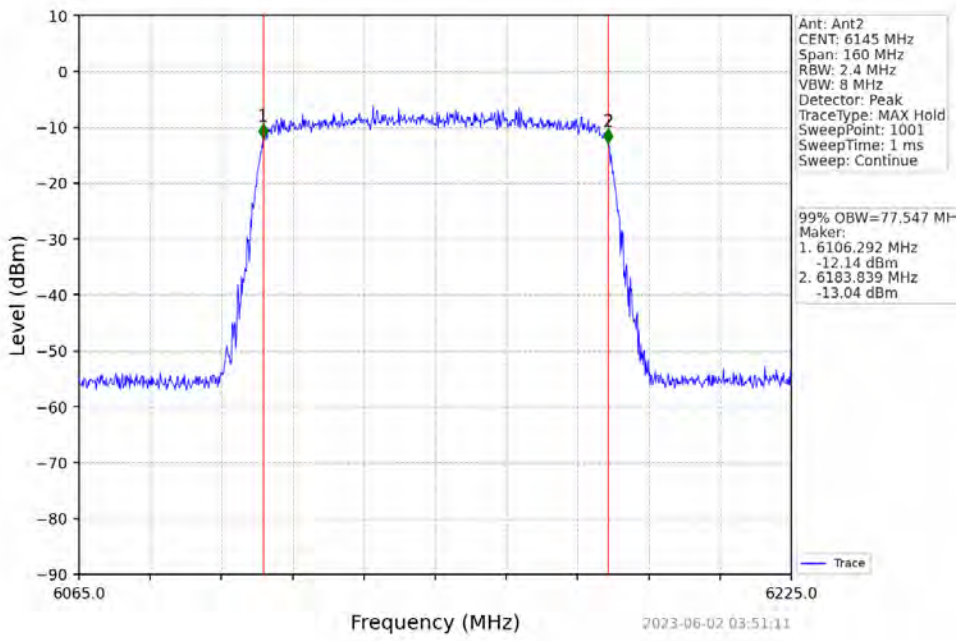
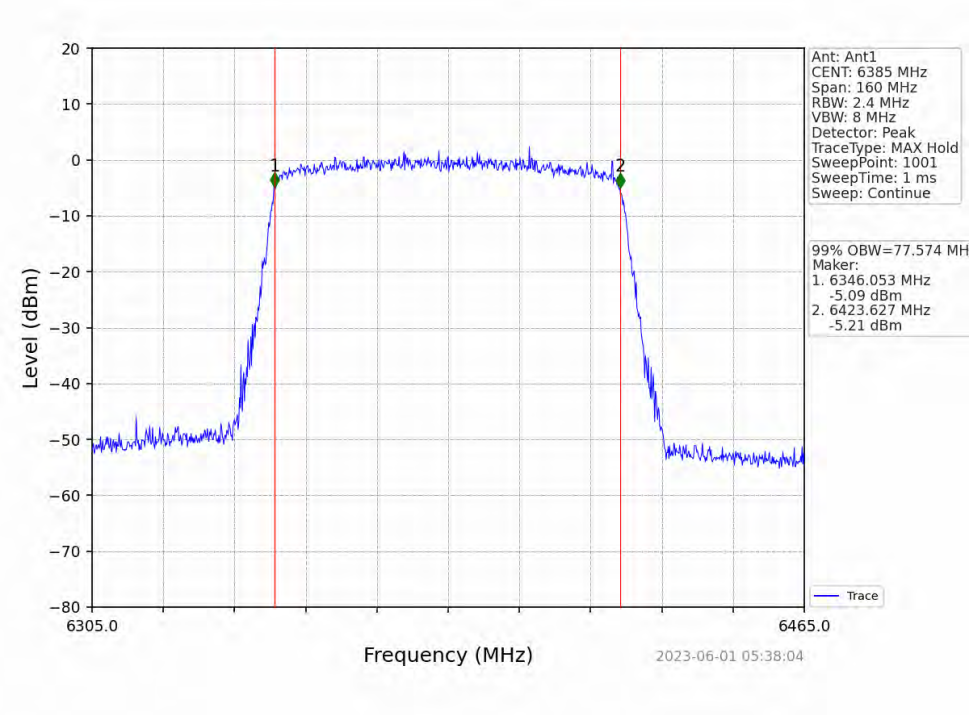
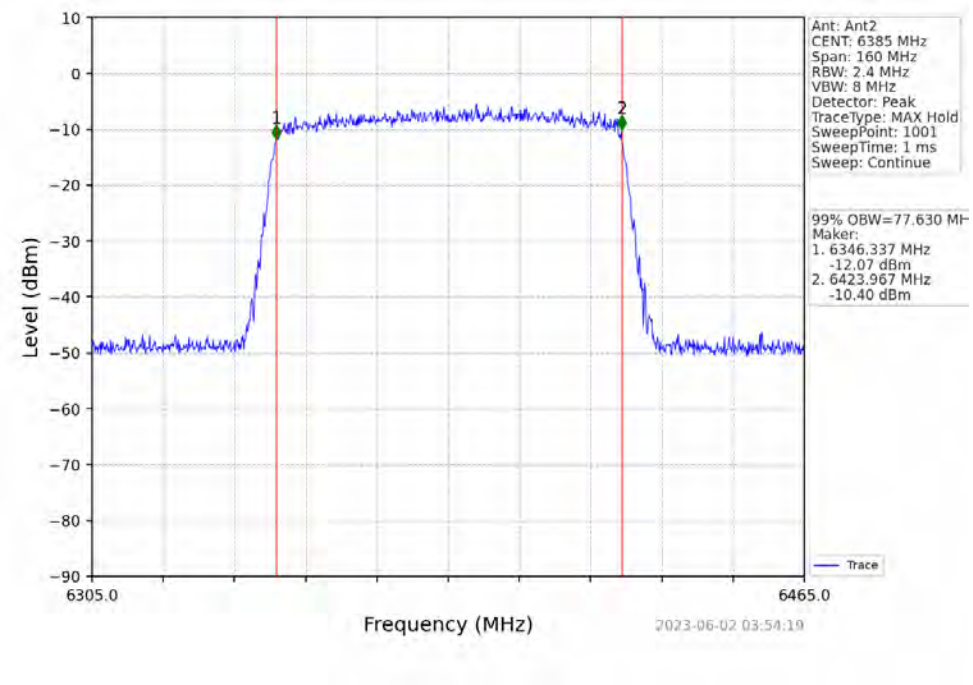


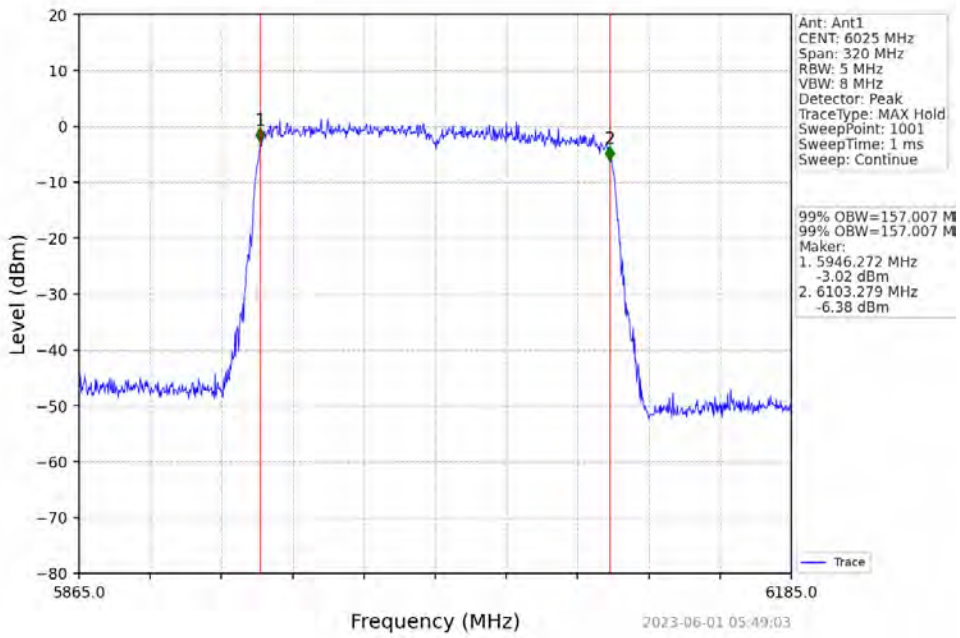
802.11ax(HEW80)_HCH_6385MHz_SU_Ant1_NTNV



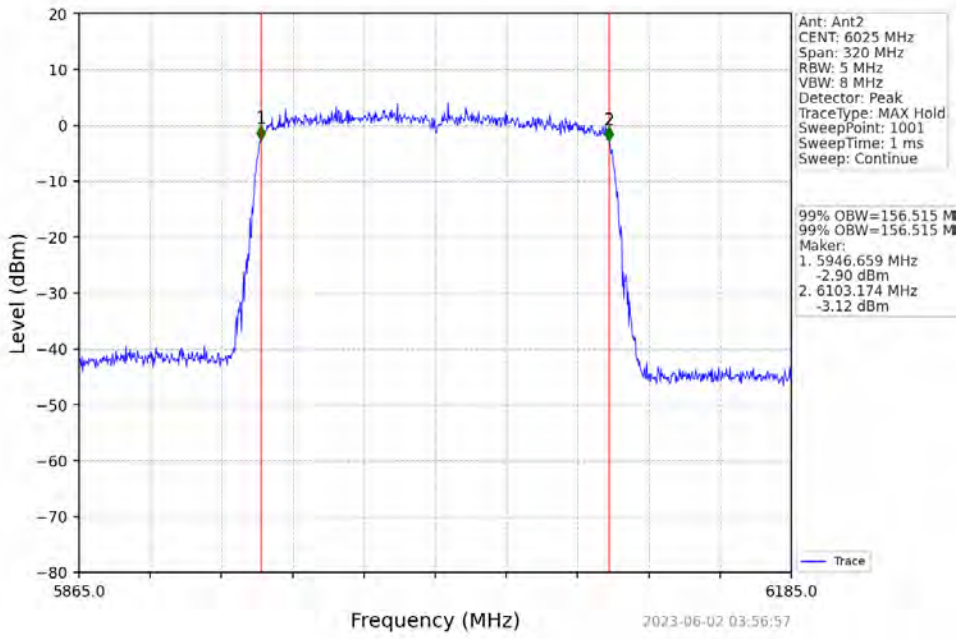
802.11ax(HEW80)_HCH_6385MHz_SU_Ant2_NTNV



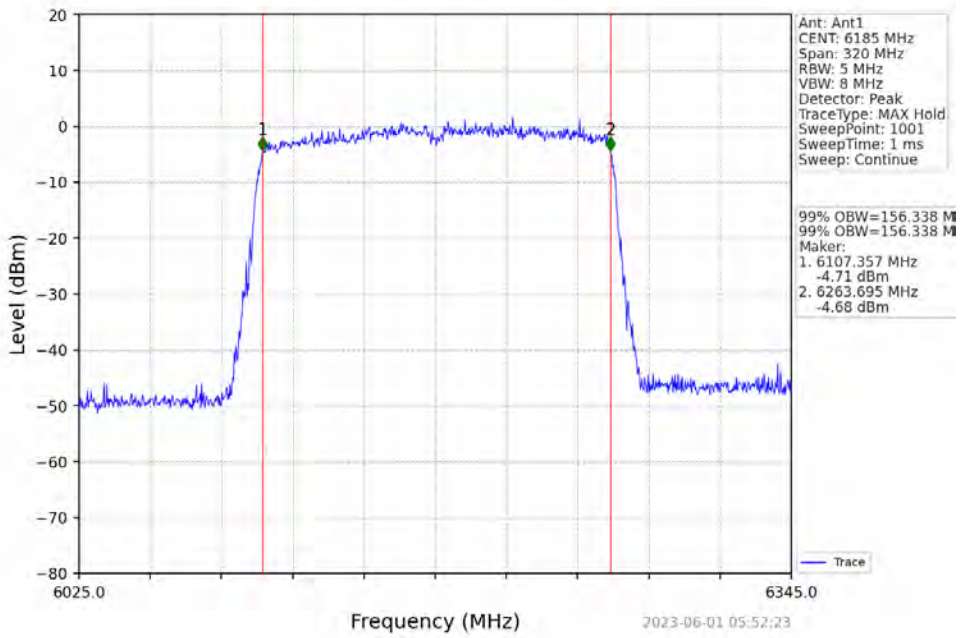
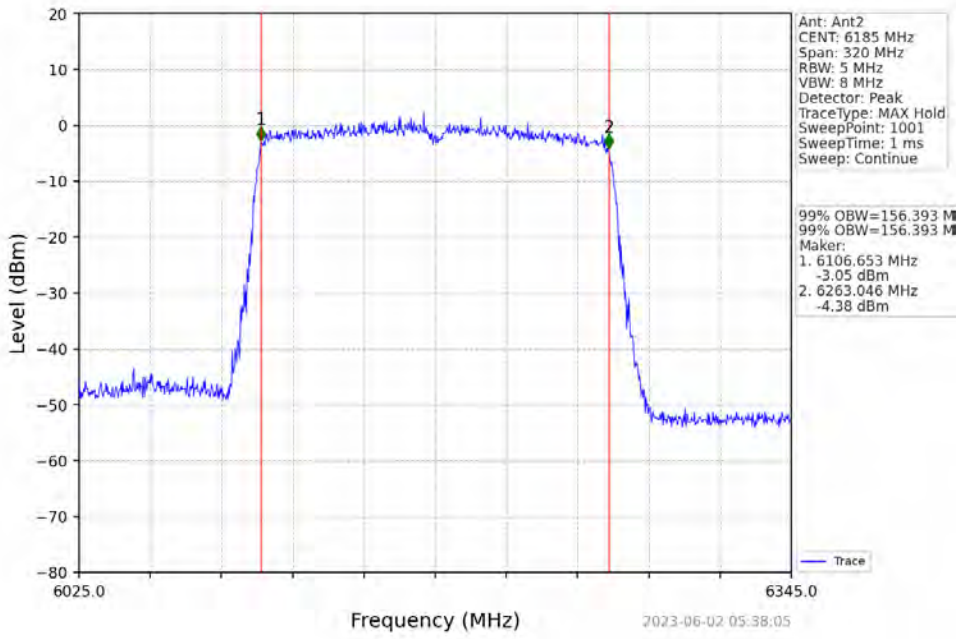
802.11ax(HEW160)_LCH_6025MHz_SU_Ant1_NTNV



802.11ax(HEW160)_LCH_6025MHz_SU_Ant2_NTNV



802.11ax(HEW160)_MCH_6185MHz_SU_Ant1_NTNV



802.11ax(HEW160)_MCH_6185MHz_SU_Ant2_NTNV