



RF Test Report

For

Project No.:	ZKT-240801L9141E-7
Model:	EF6-2
Client:	Autel Robotics Co., Ltd.
Manufacturer:	Autel Robotics Co., Ltd.
Product Description:	Autel Smart Controller SE V2
Test Engineer:	Jim Liu
Test Date:	2024-05-28

Test Summary

Item	Result
Duty Cycle	Pass
Bandwidth	Pass
Maximum Conducted Output Power	Pass
Maximum Power Spectral Density	Pass
Frequency Stability	Pass
Form731	Pass



1. Duty Cycle

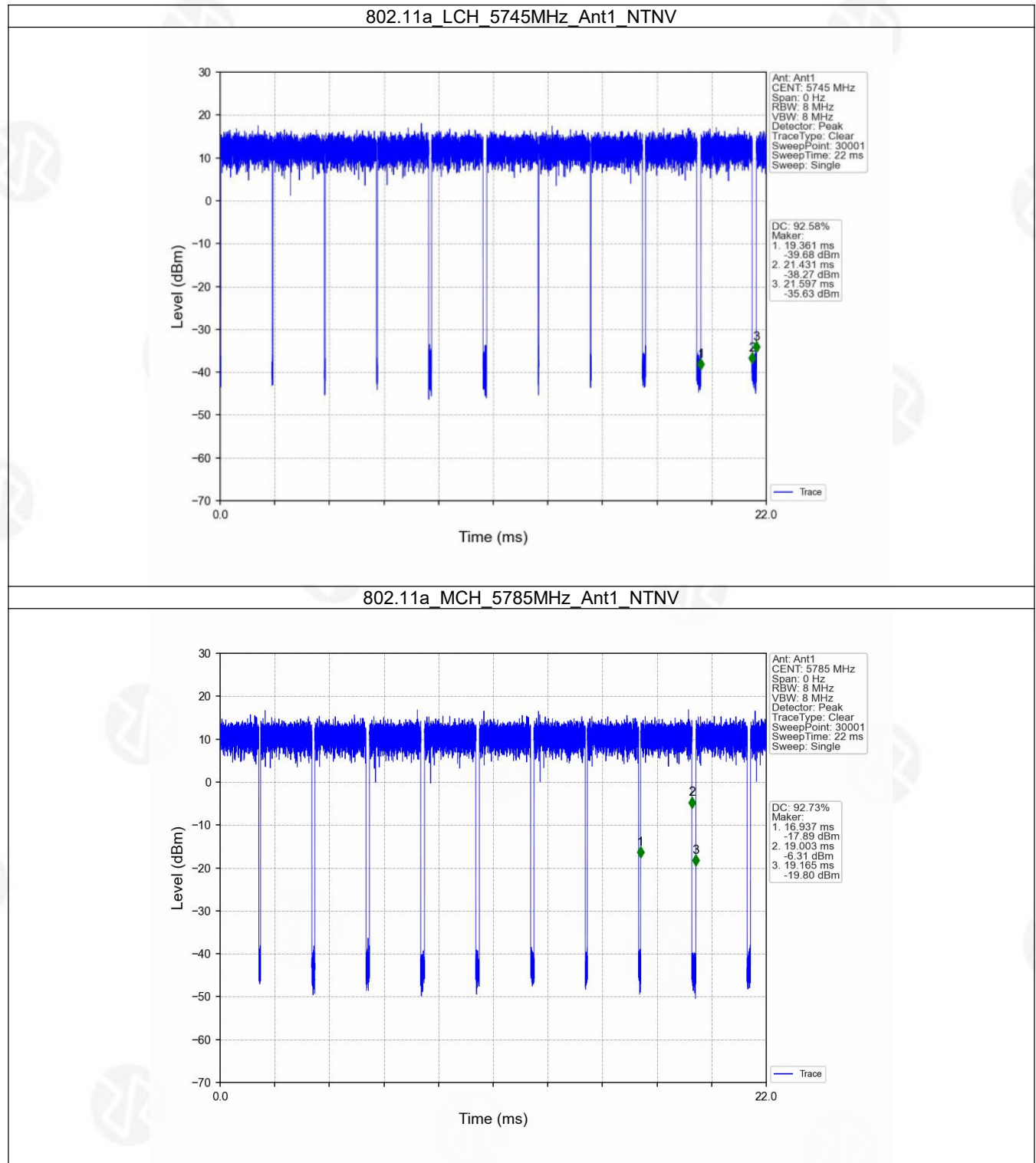
1.1 Ant1

1.1.1 Test Result

Ant1							
Mode	Tx Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
802.11a	SISO	5745	2.070	2.236	92.58	0.34	5.95
		5785	2.066	2.228	92.73	0.33	3.52
		5825	2.066	2.201	93.87	0.27	3.57
802.11n (HT20)	SISO	5745	1.926	2.093	92.02	0.36	6.38
		5785	1.926	2.048	94.04	0.27	4.37
		5825	1.922	2.092	91.87	0.37	4.99
802.11n (HT40)	SISO	5755	0.950	1.117	85.05	0.70	11.70
		5795	0.950	1.116	85.13	0.70	11.70
802.11ac (VHT20)	SISO	5745	1.934	2.105	91.88	0.37	5.82
		5785	1.934	2.106	91.83	0.37	4.10
		5825	1.938	2.105	92.07	0.36	5.91
802.11ac (VHT40)	SISO	5755	0.954	1.116	85.48	0.68	10.89
		5795	0.953	1.116	85.39	0.69	10.82
802.11ac (VHT80)	SISO	5775	0.462	0.588	78.57	1.05	14.19

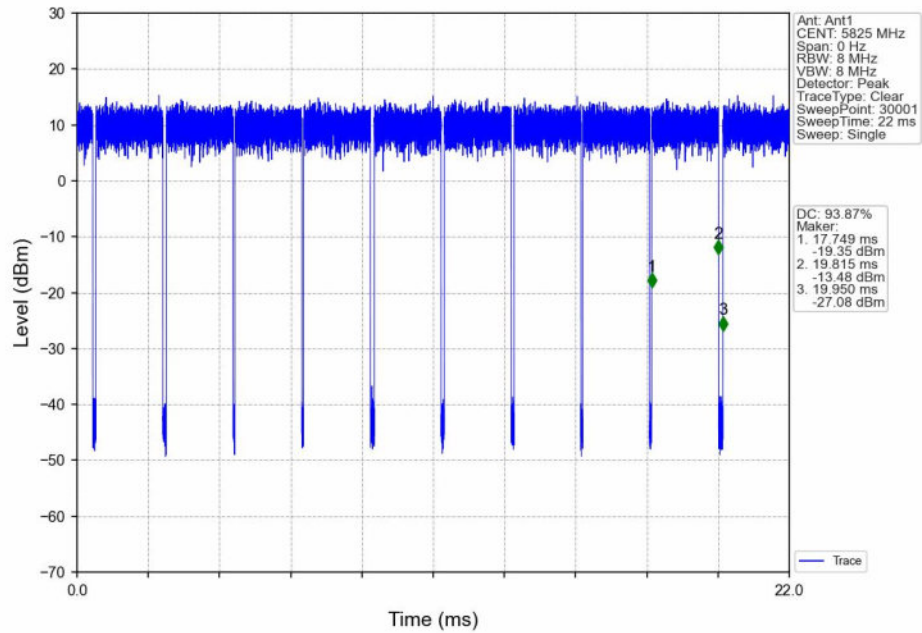


1.1.2 Test Graph

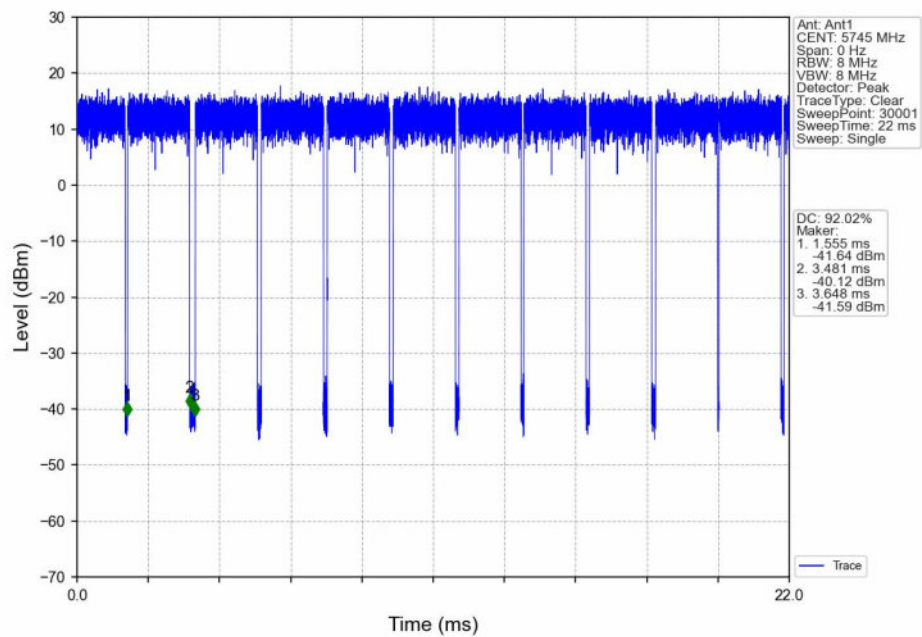




802.11a_HCH_5825MHz_Ant1_NTNV

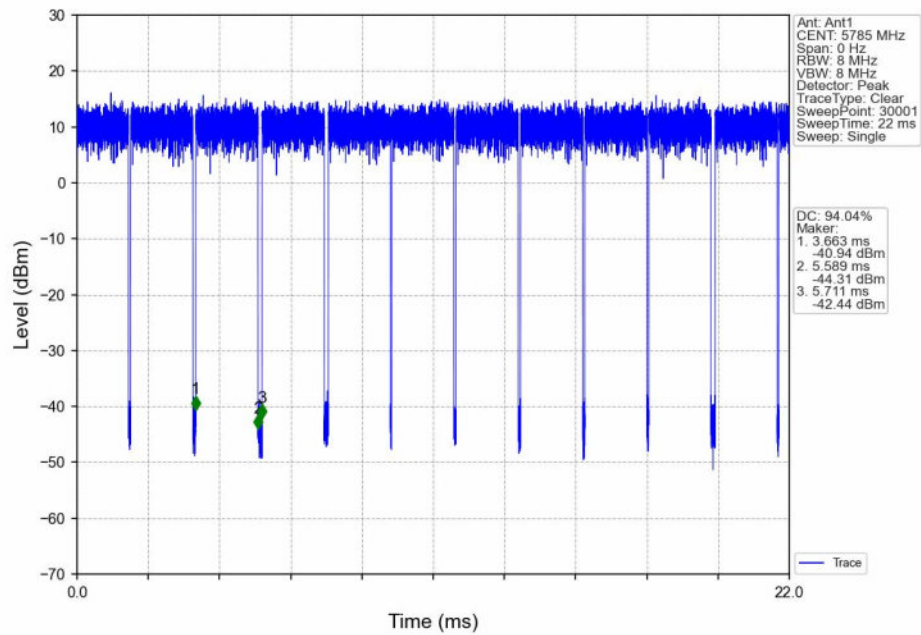


802.11n(HT20)_LCH_5745MHz_Ant1_NTNV

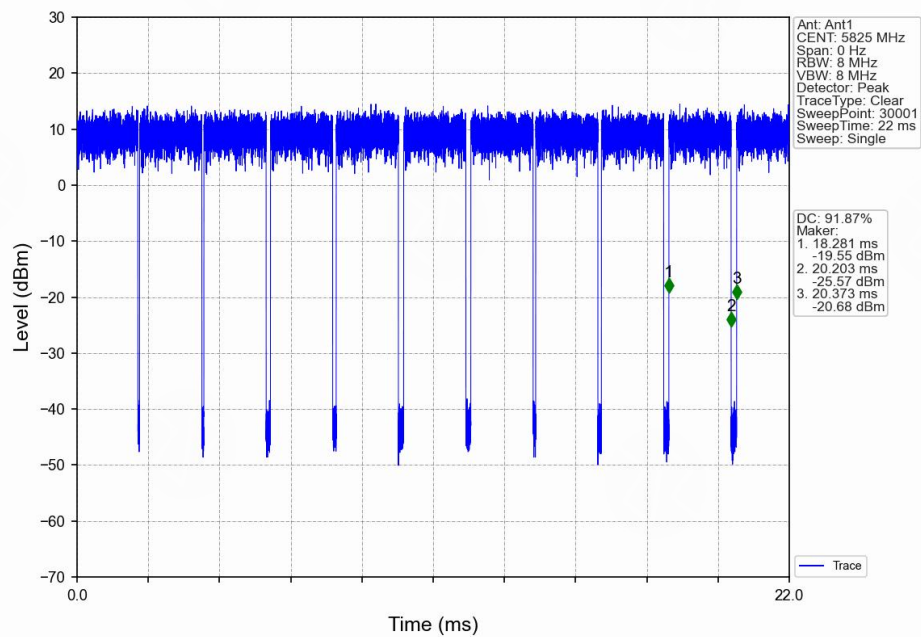




802.11n(HT20)_MCH_5785MHz_Ant1_NTNV

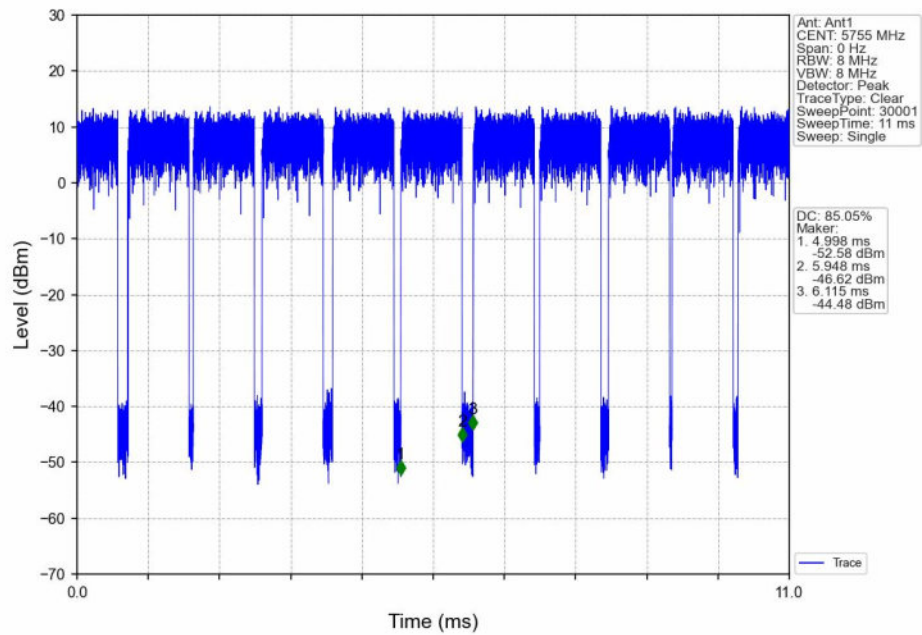


802.11n(HT20)_HCH_5825MHz_Ant1_NTNV

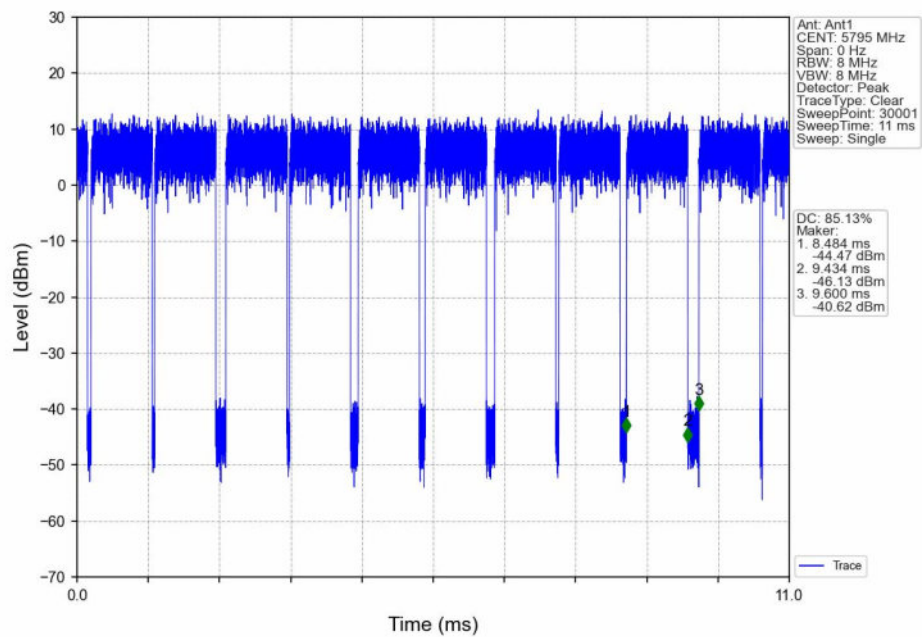




802.11n(HT40)_LCH_5755MHz_Ant1_NTNV

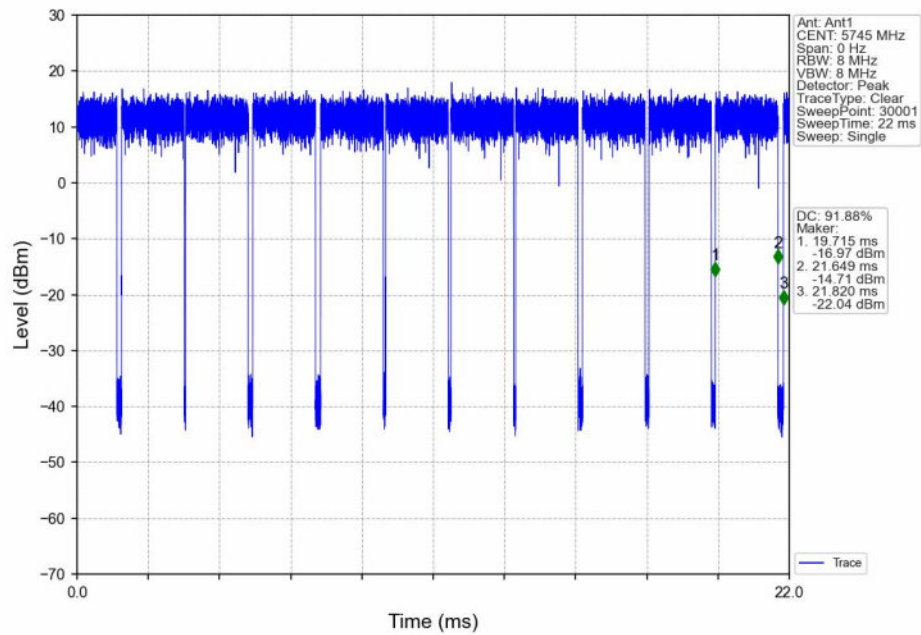


802.11n(HT40)_HCH_5795MHz_Ant1_NTNV

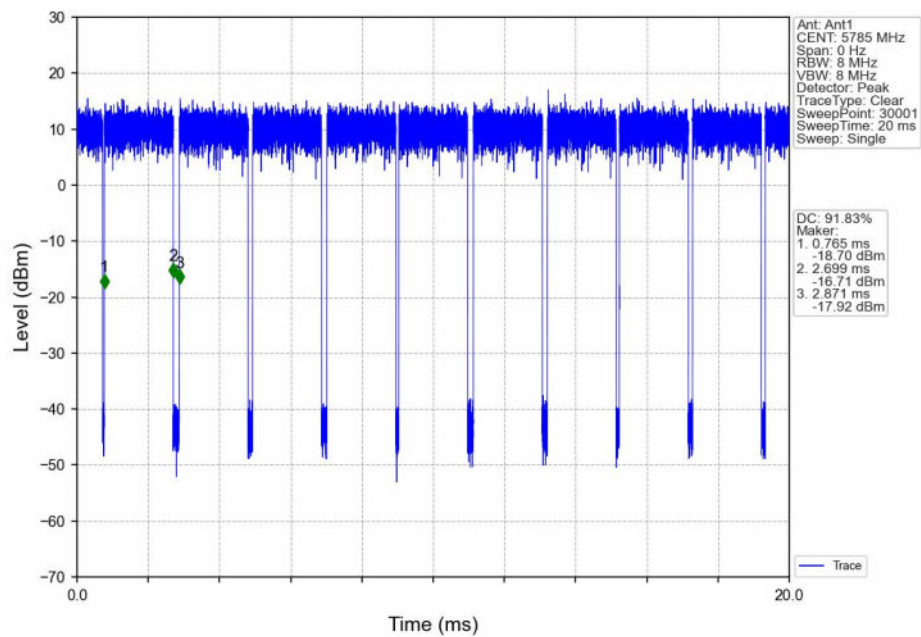




802.11ac(VHT20)_LCH_5745MHz_Ant1_NTNV

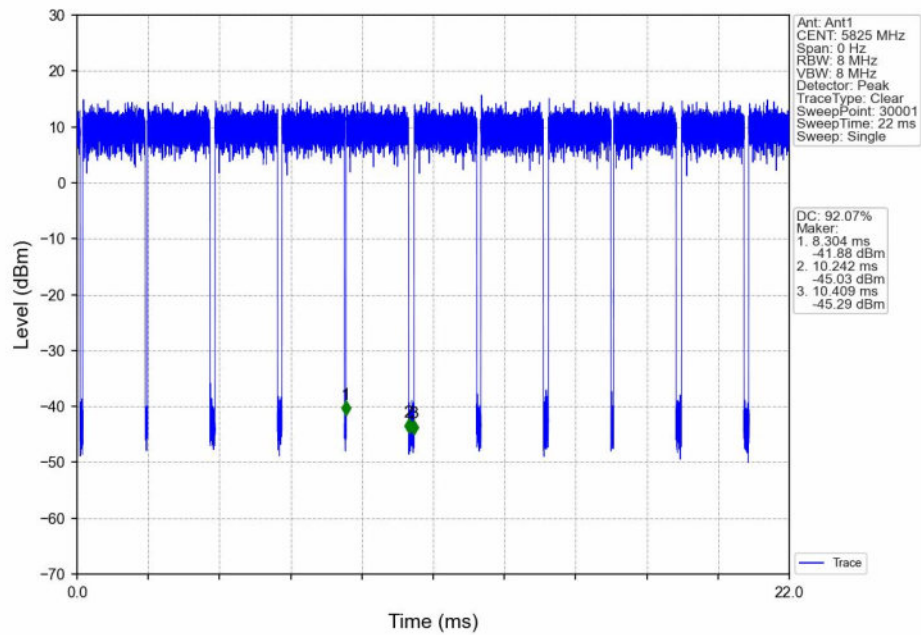


802.11ac(VHT20)_MCH_5785MHz_Ant1_NTNV

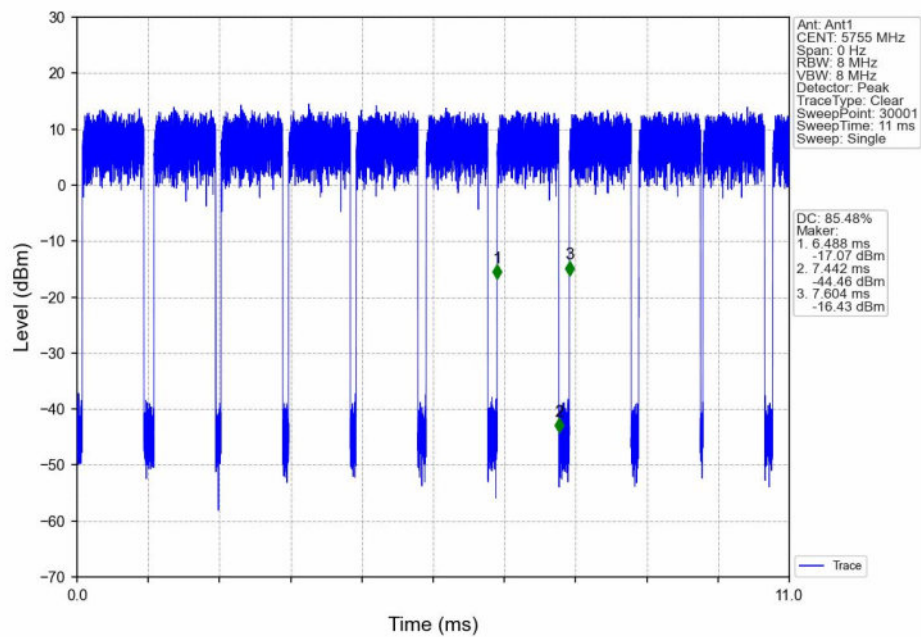




802.11ac(VHT20)_HCH_5825MHz_Ant1_NTNV

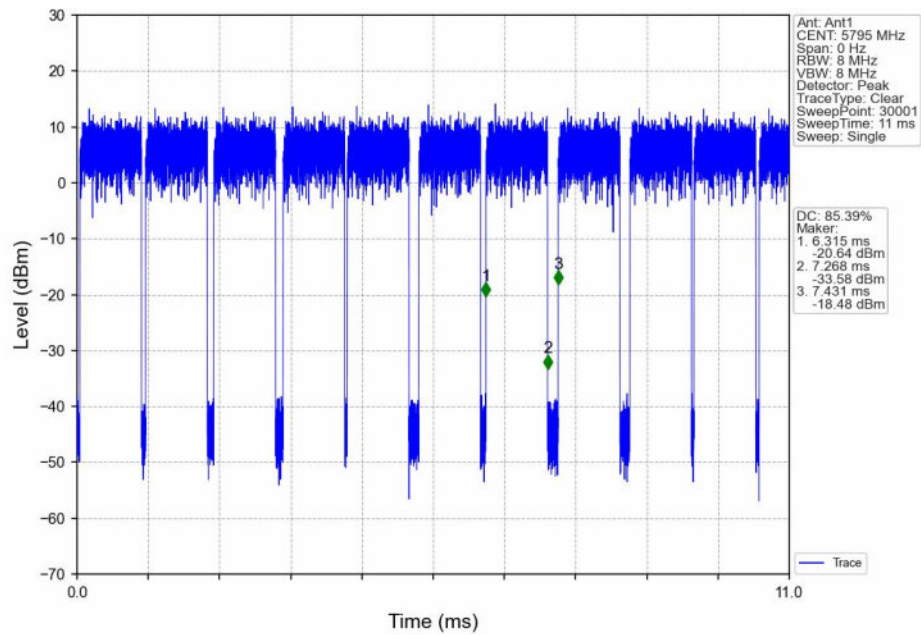


802.11ac(VHT40)_LCH_5755MHz_Ant1_NTNV

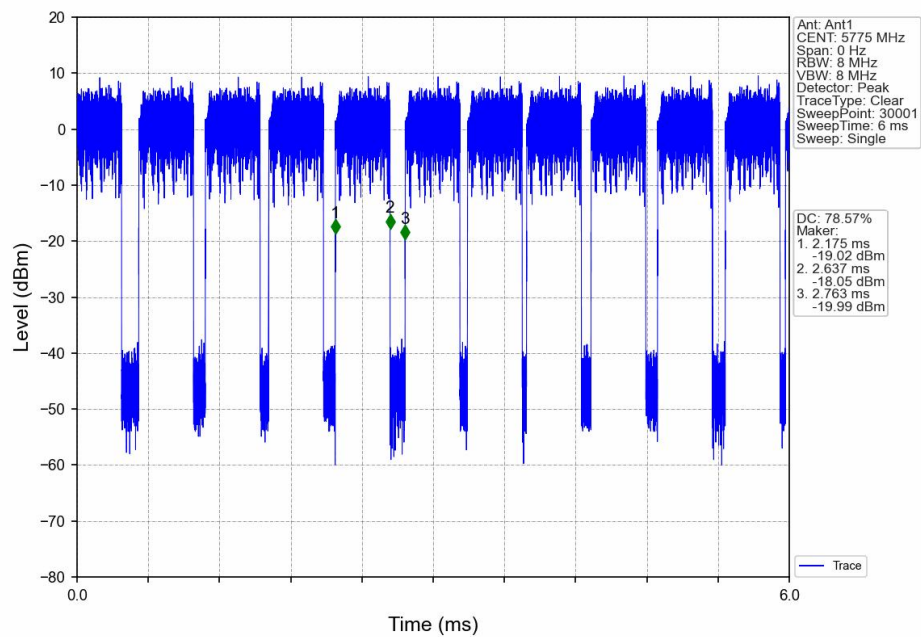




802.11ac(VHT40)_HCH_5795MHz_Ant1_NTNV



802.11ac(VHT80)_MCH_5775MHz_Ant1_NTNV





2. Bandwidth

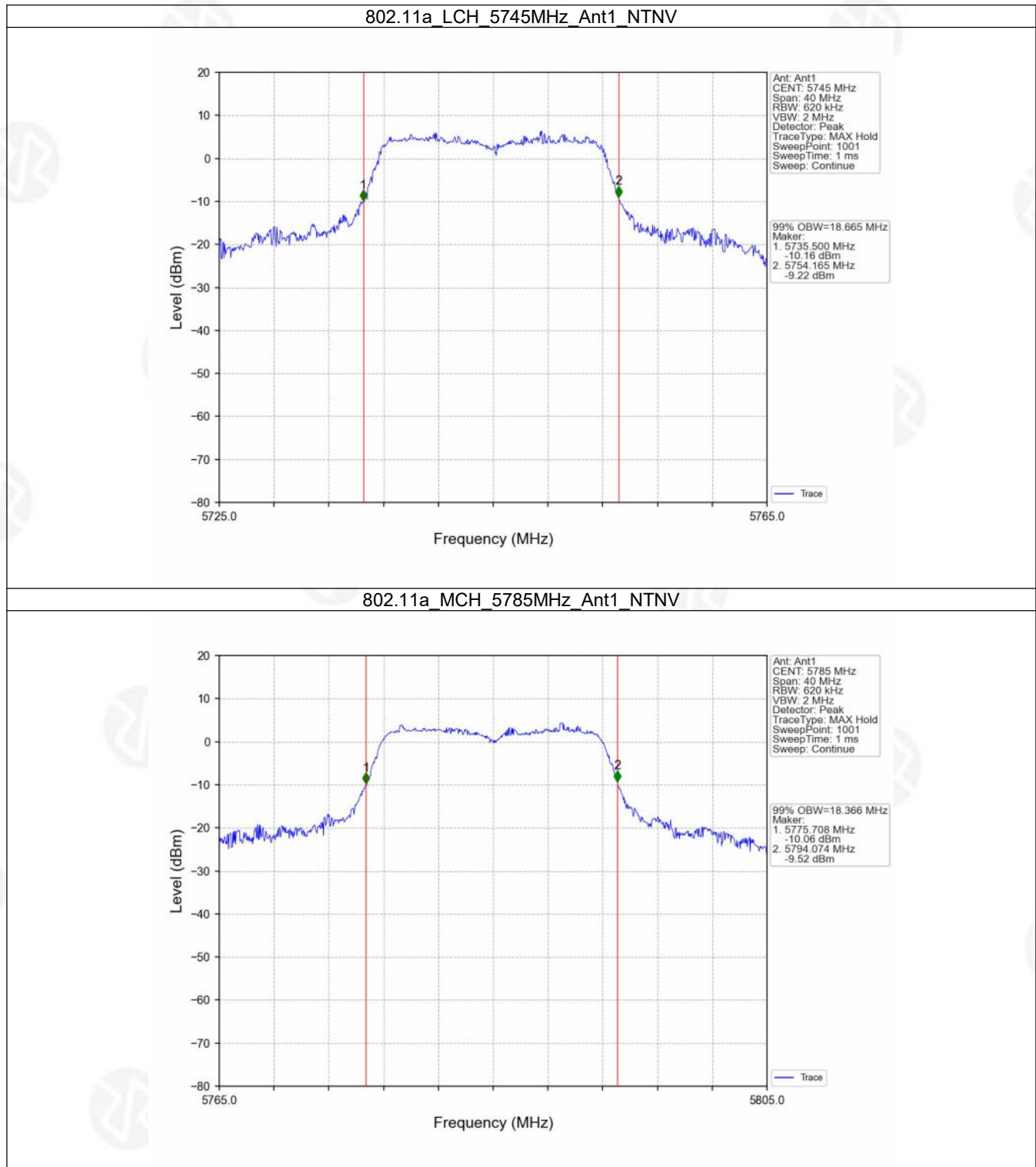
2.1 OBW

2.1.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	99% Occupied Bandwidth (MHz)		Verdict
				Result	Limit	
802.11a	SISO	5745	1	18.665	/	Pass
		5785	1	18.366	/	Pass
		5825	1	18.281	/	Pass
802.11n (HT20)	SISO	5745	1	19.292	/	Pass
		5785	1	19.185	/	Pass
		5825	1	18.780	/	Pass
802.11n (HT40)	SISO	5755	1	37.517	/	Pass
		5795	1	37.585	/	Pass
802.11ac (VHT20)	SISO	5745	1	19.122	/	Pass
		5785	1	18.897	/	Pass
		5825	1	18.772	/	Pass
802.11ac (VHT40)	SISO	5755	1	38.230	/	Pass
		5795	1	37.542	/	Pass
802.11ac (VHT80)	SISO	5775	1	77.423	/	Pass

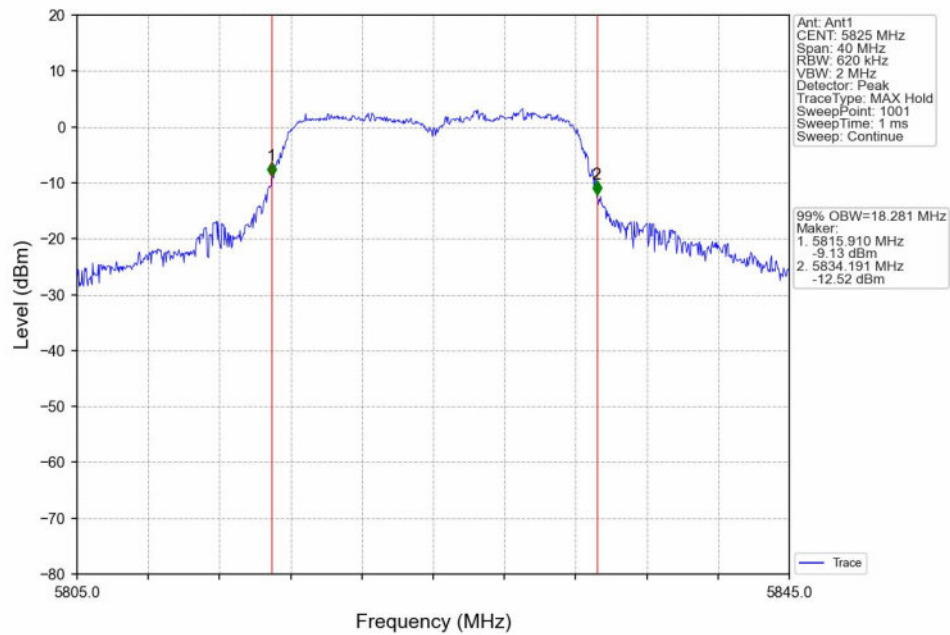


2.1.2 Test Graph

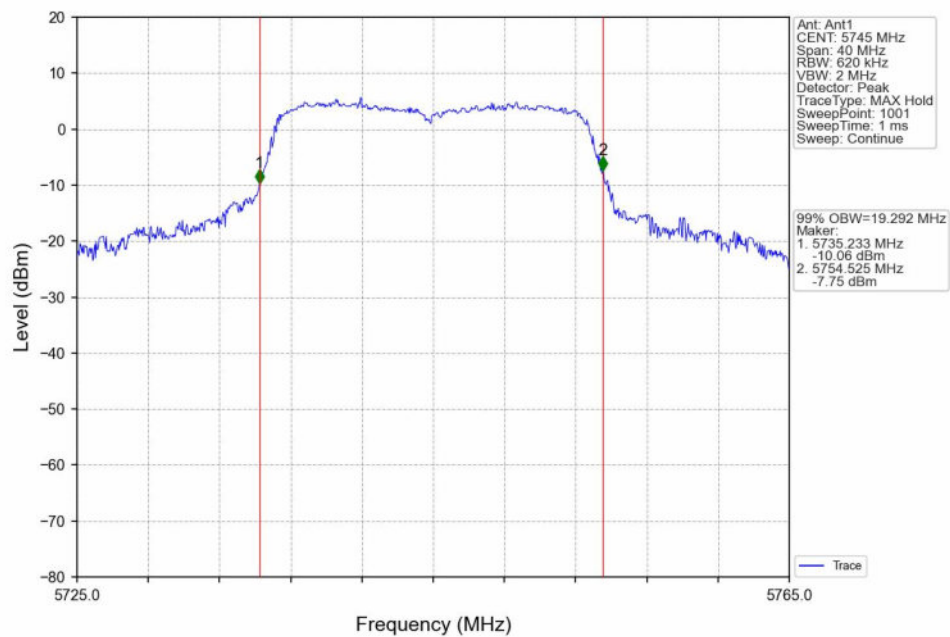




802.11a_HCH_5825MHz_Ant1_NTNV

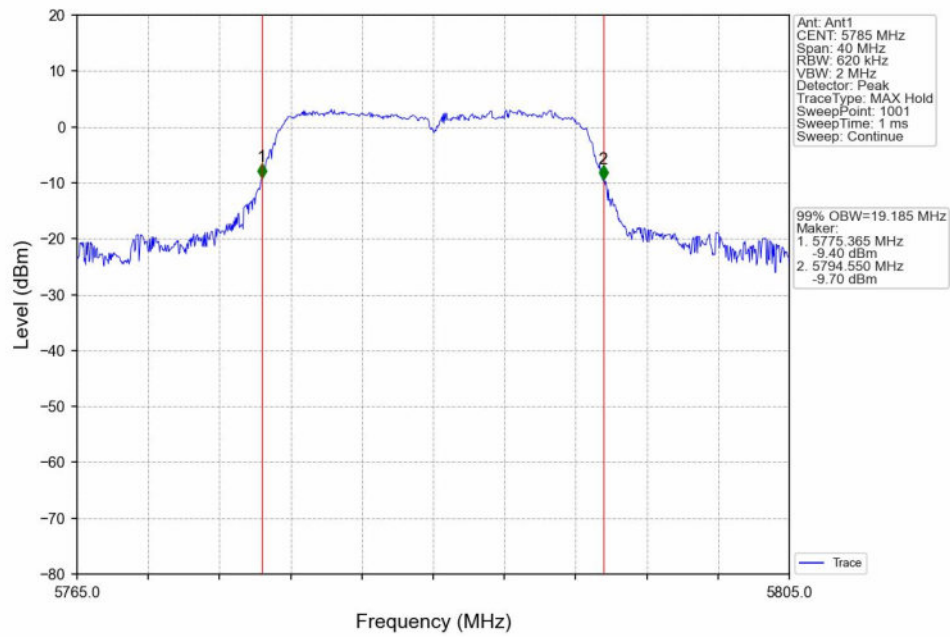


802.11n(HT20)_LCH_5745MHz_Ant1_NTNV

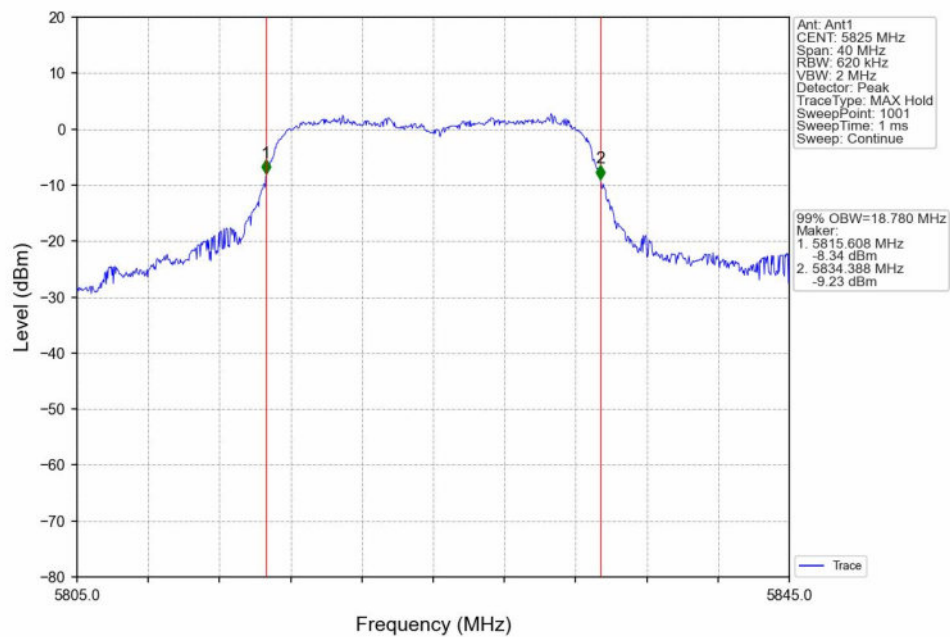




802.11n(HT20)_MCH_5785MHz_Ant1_NTNV

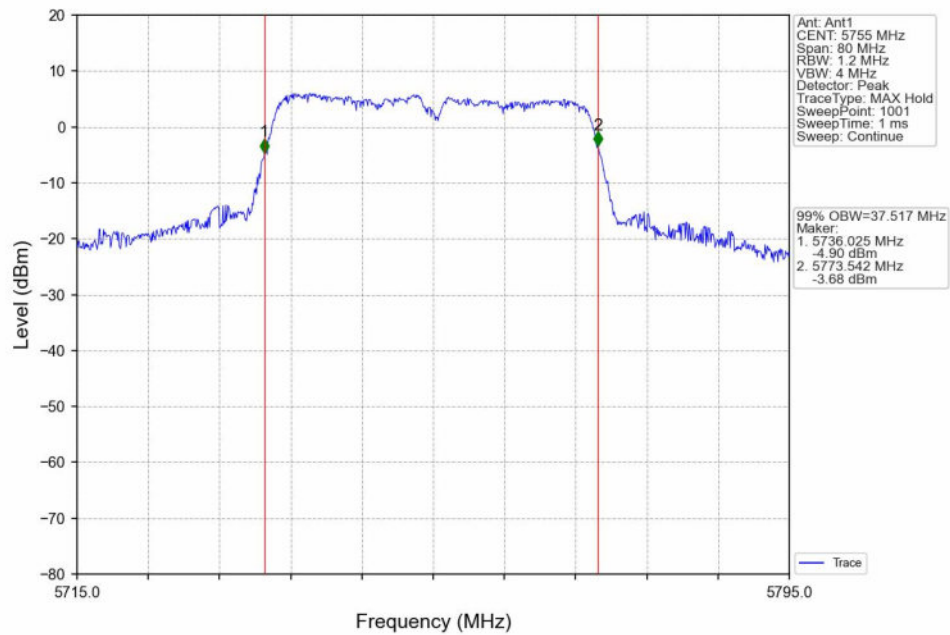


802.11n(HT20)_HCH_5825MHz_Ant1_NTNV

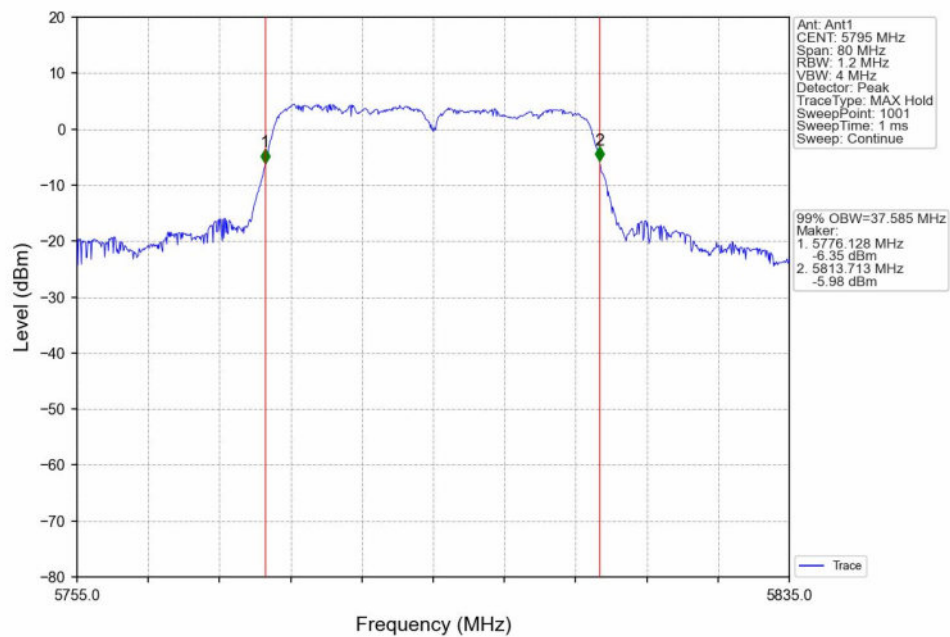




802.11n(HT40)_LCH_5755MHz_Ant1_NTNV

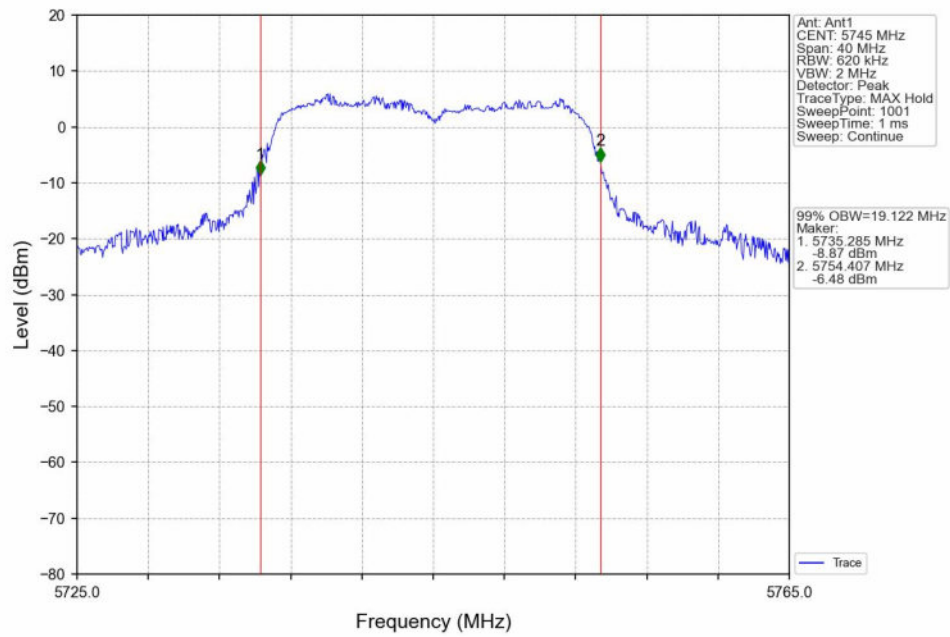


802.11n(HT40)_HCH_5795MHz_Ant1_NTNV

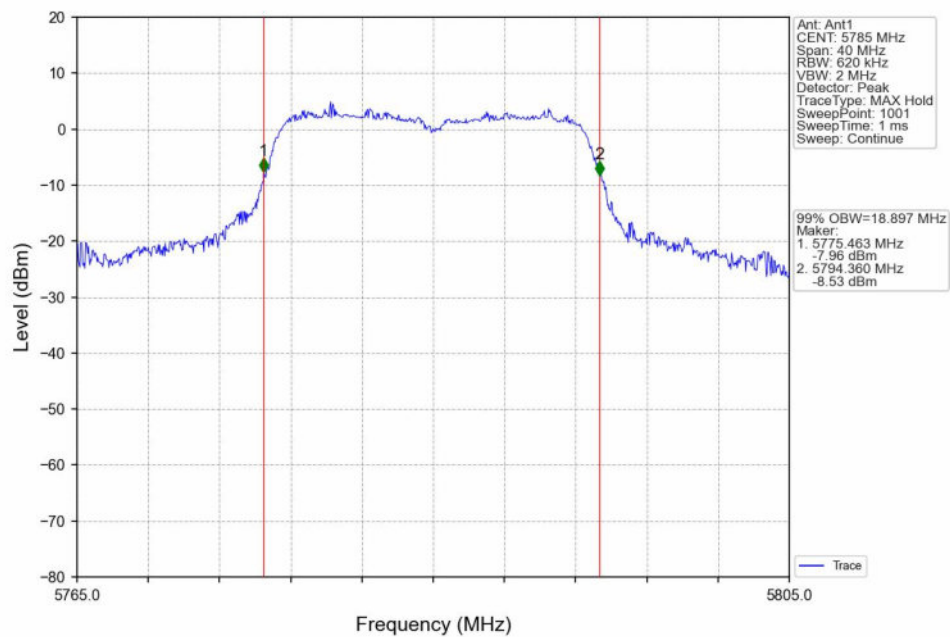




802.11ac(VHT20)_LCH_5745MHz_Ant1_NTNV

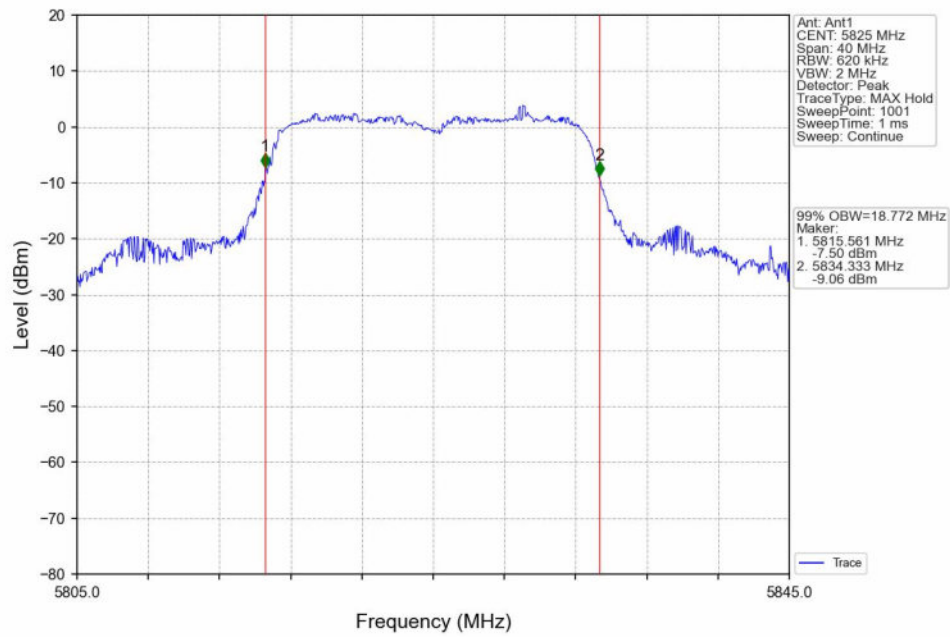


802.11ac(VHT20)_MCH_5785MHz_Ant1_NTNV

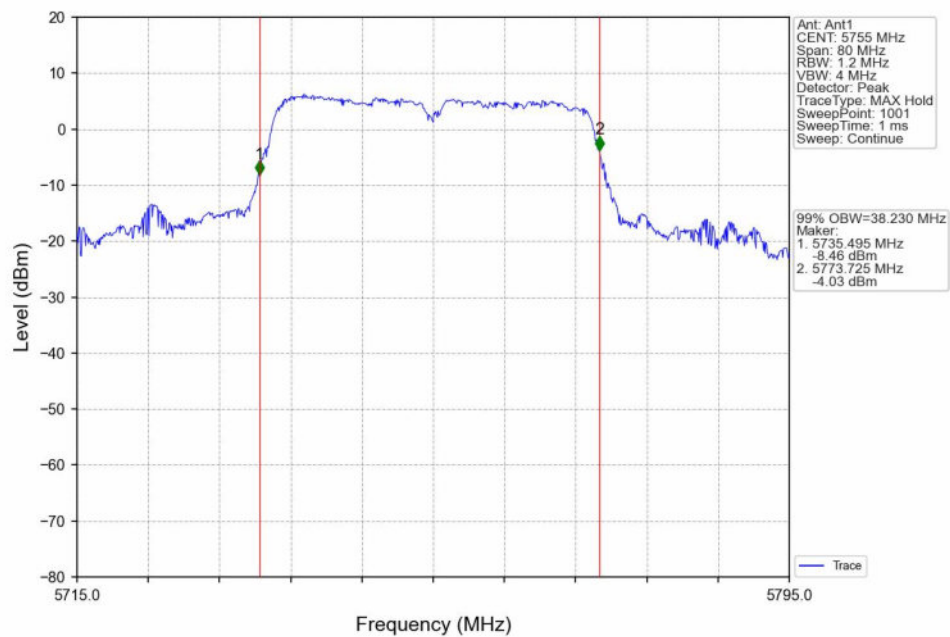




802.11ac(VHT20)_HCH_5825MHz_Ant1_NTNV

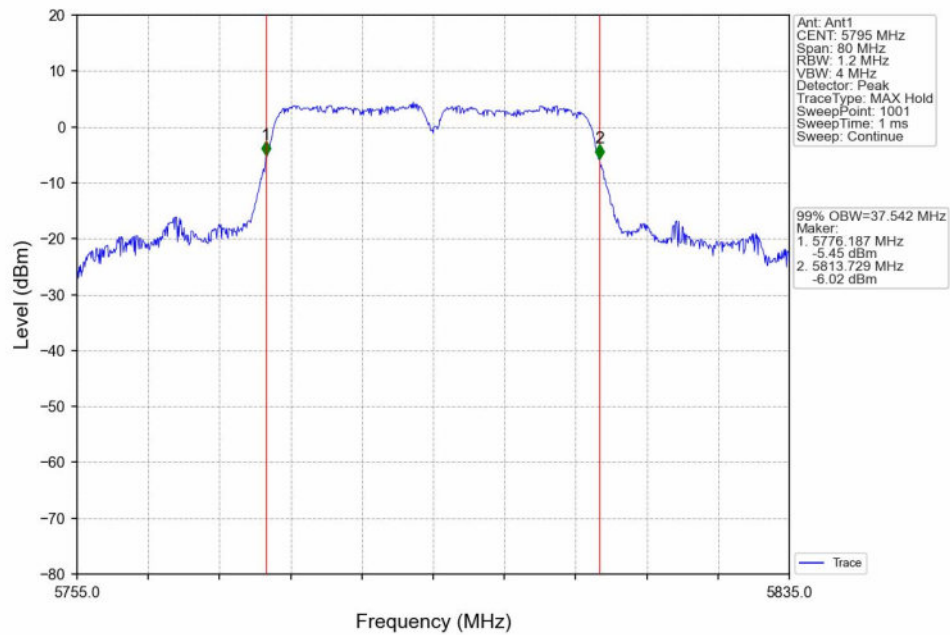


802.11ac(VHT40)_LCH_5755MHz_Ant1_NTNV

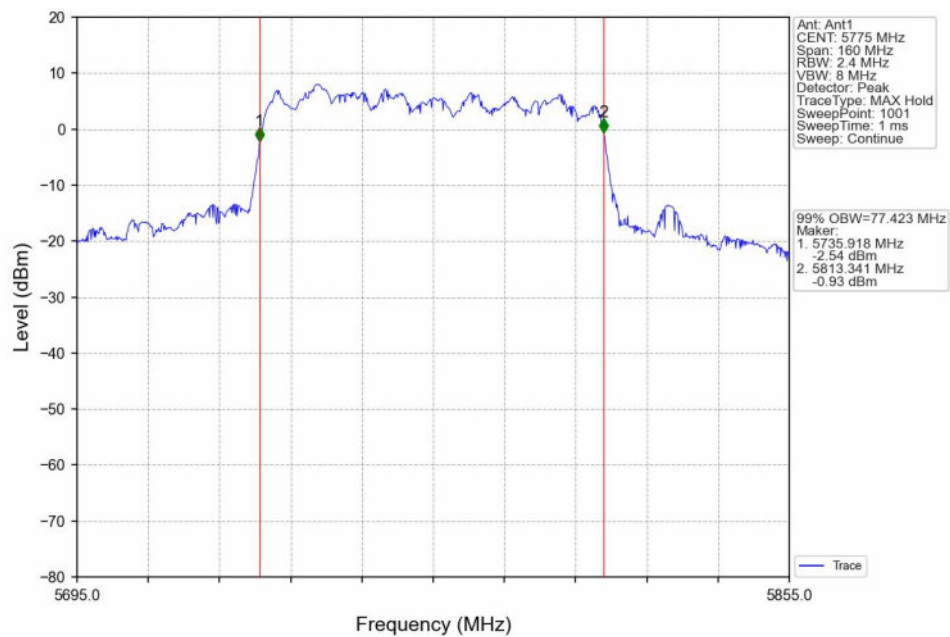




802.11ac(VHT40)_HCH_5795MHz_Ant1_NTNV



802.11ac(VHT80)_MCH_5775MHz_Ant1_NTNV





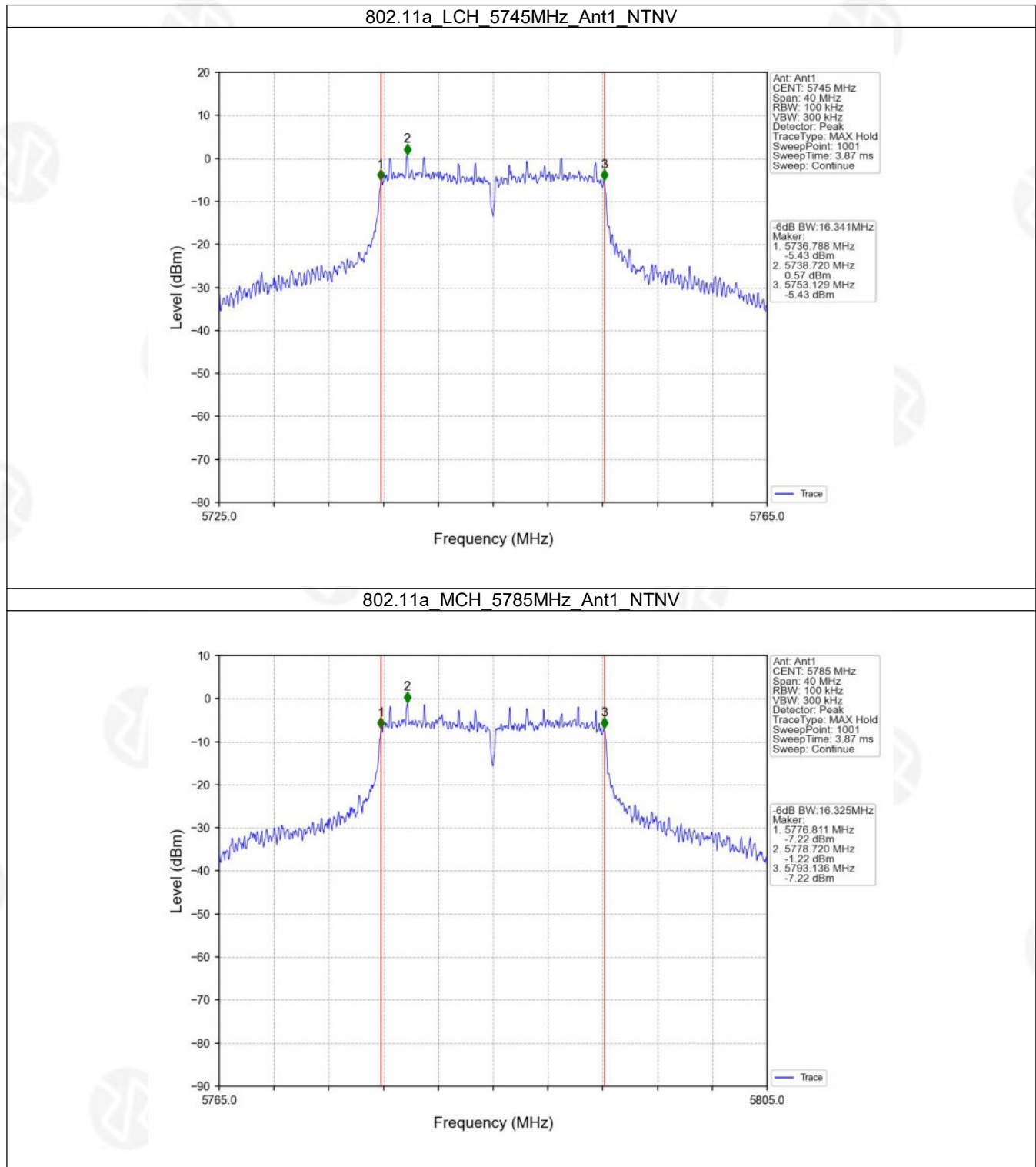
2.2 6dB BW

2.2.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
802.11a	SISO	5745	1	16.341	≥ 0.5	Pass
		5785	1	16.325	≥ 0.5	Pass
		5825	1	16.322	≥ 0.5	Pass
802.11n (HT20)	SISO	5745	1	16.825	≥ 0.5	Pass
		5785	1	16.979	≥ 0.5	Pass
		5825	1	17.023	≥ 0.5	Pass
802.11n (HT40)	SISO	5755	1	35.201	≥ 0.5	Pass
		5795	1	35.495	≥ 0.5	Pass
802.11ac (VHT20)	SISO	5745	1	16.336	≥ 0.5	Pass
		5785	1	16.795	≥ 0.5	Pass
		5825	1	17.037	≥ 0.5	Pass
802.11ac (VHT40)	SISO	5755	1	35.166	≥ 0.5	Pass
		5795	1	35.212	≥ 0.5	Pass
802.11ac (VHT80)	SISO	5775	1	73.921	≥ 0.5	Pass

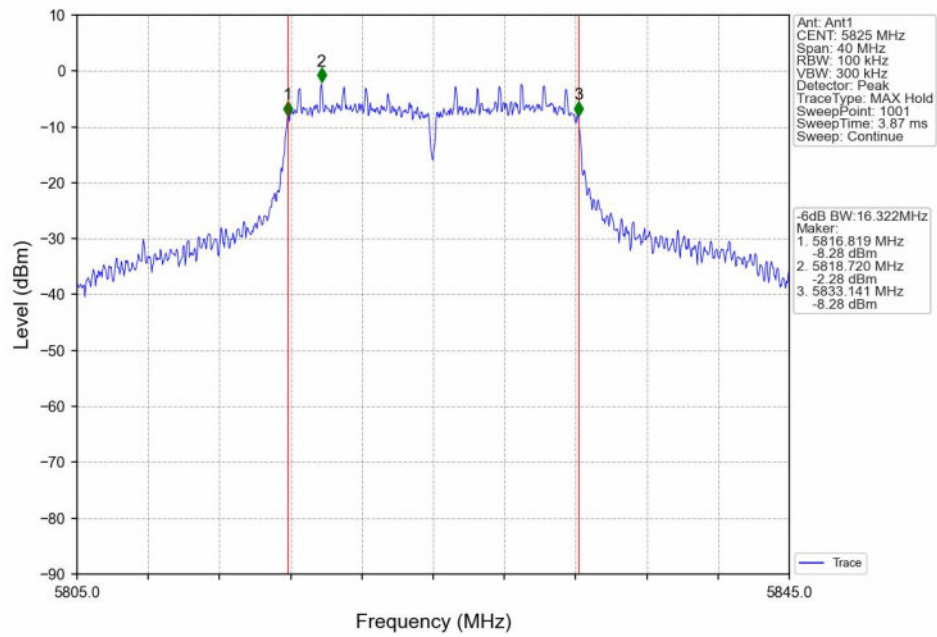


2.2.2 Test Graph

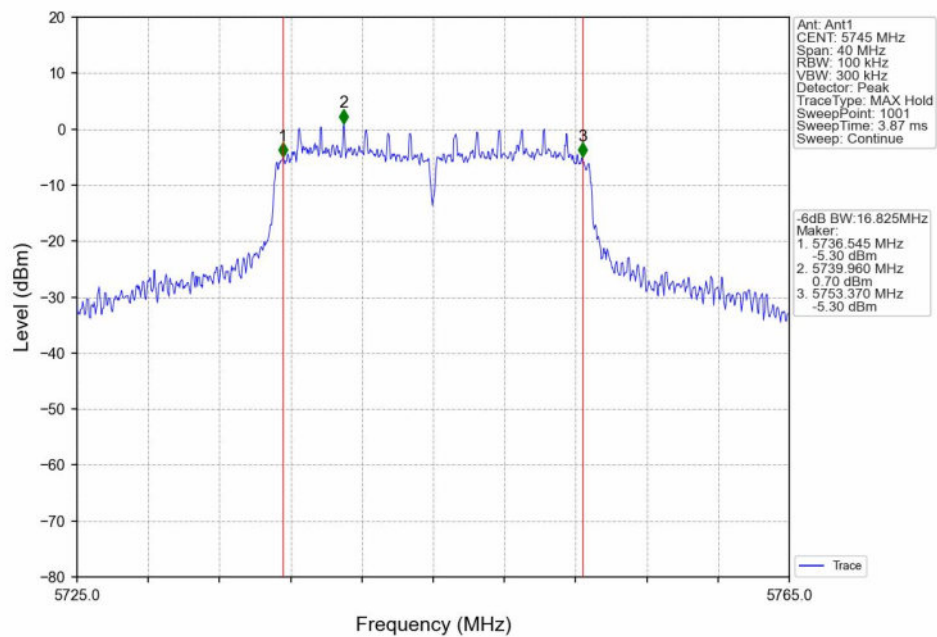




802.11a_HCH_5825MHz_Ant1_NTNV

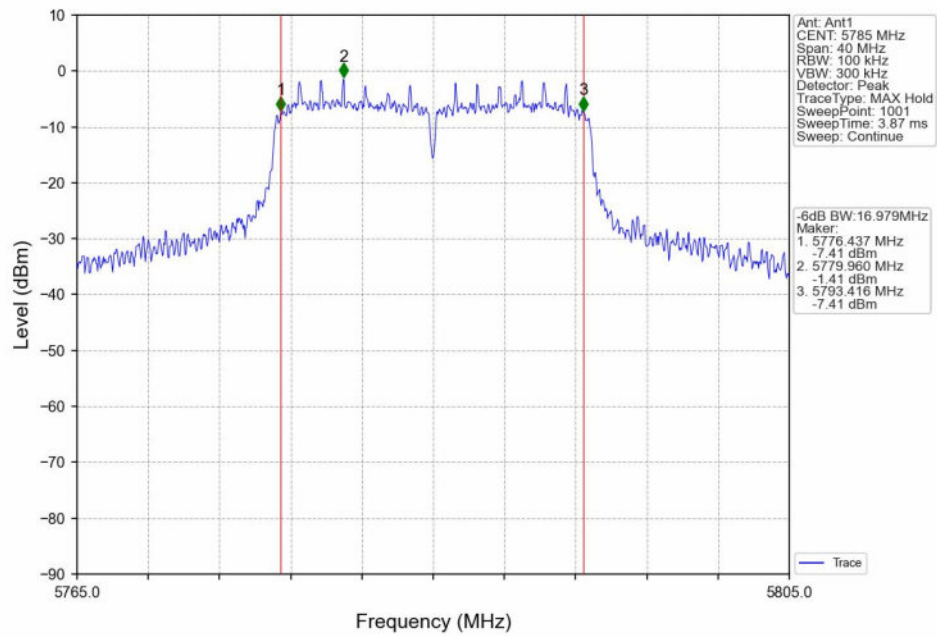


802.11n(HT20)_LCH_5745MHz_Ant1_NTNV

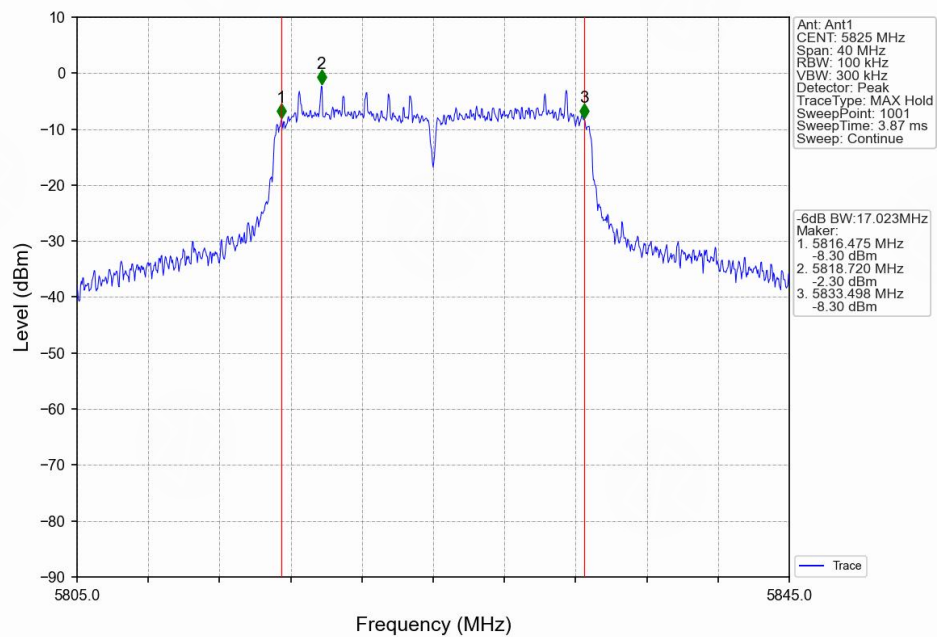




802.11n(HT20)_MCH_5785MHz_Ant1_NTNV

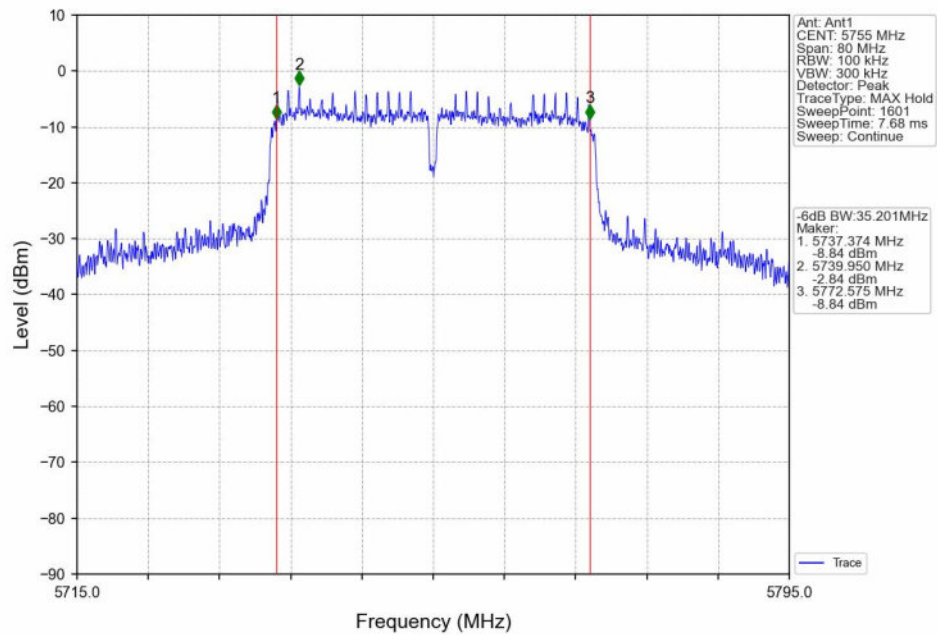


802.11n(HT20)_HCH_5825MHz_Ant1_NTNV

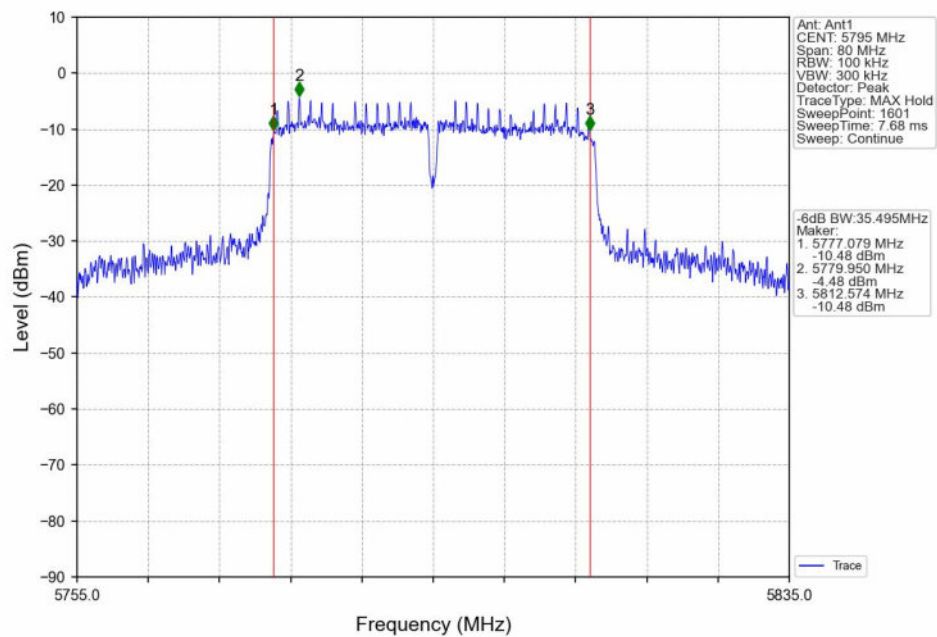




802.11n(HT40)_LCH_5755MHz_Ant1_NTNV

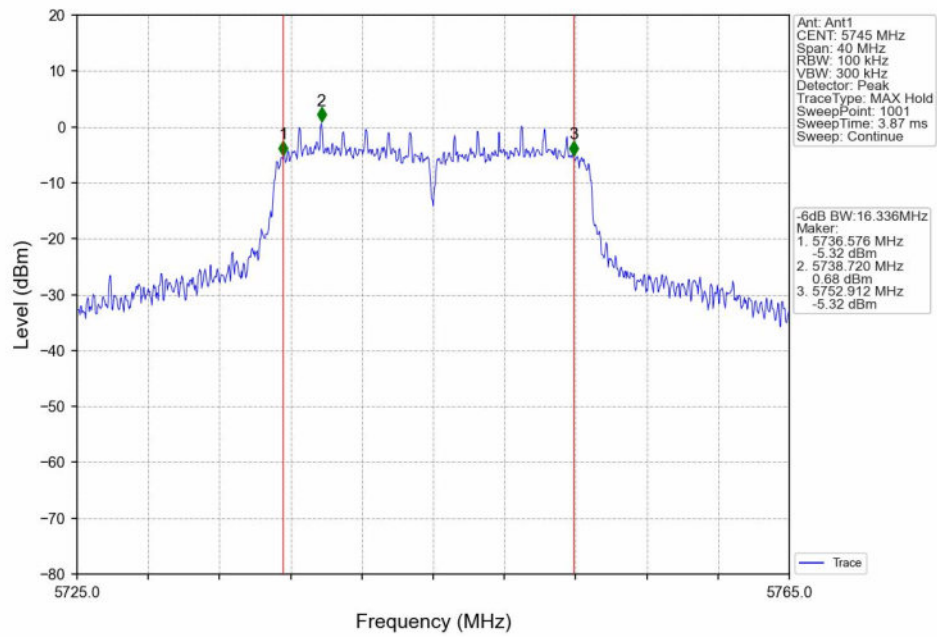


802.11n(HT40)_HCH_5795MHz_Ant1_NTNV

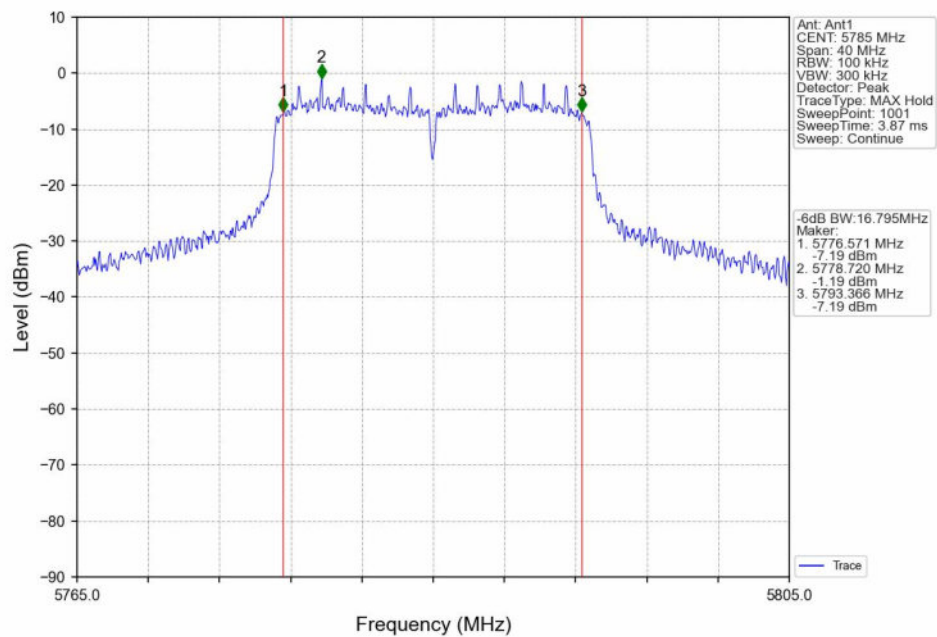




802.11ac(VHT20)_LCH_5745MHz_Ant1_NTNV

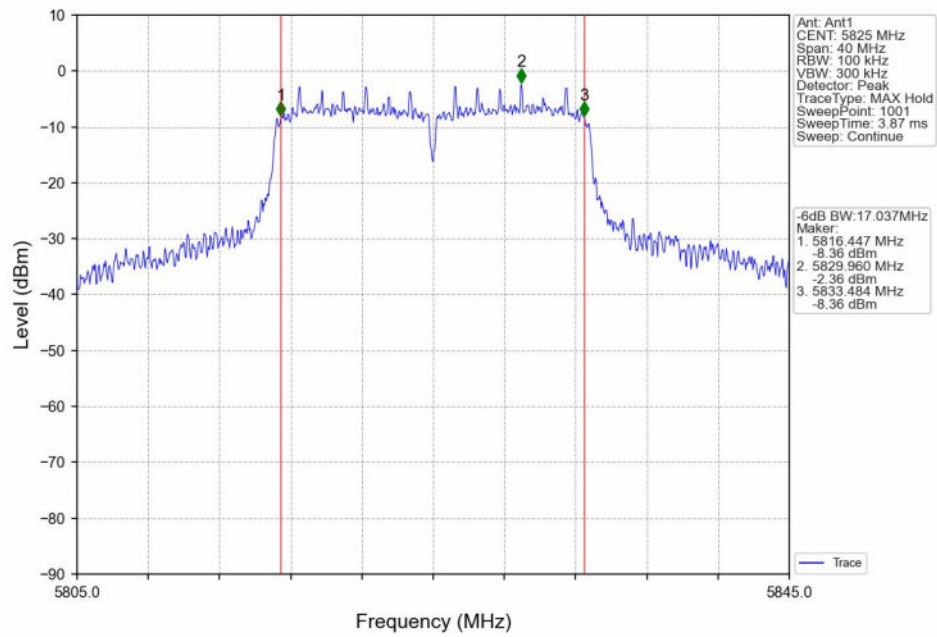


802.11ac(VHT20)_MCH_5785MHz_Ant1_NTNV

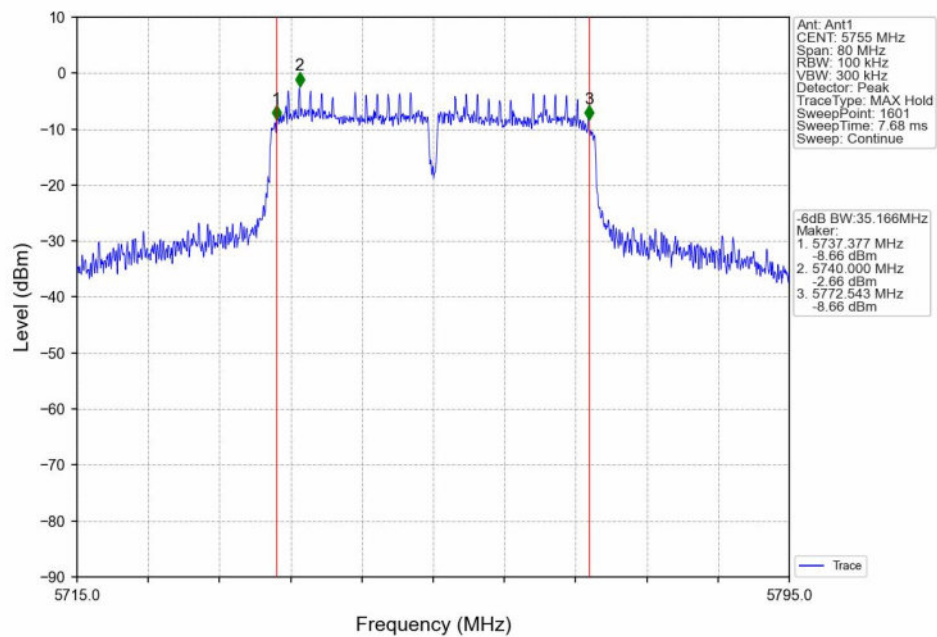




802.11ac(VHT20)_HCH_5825MHz_Ant1_NTNV

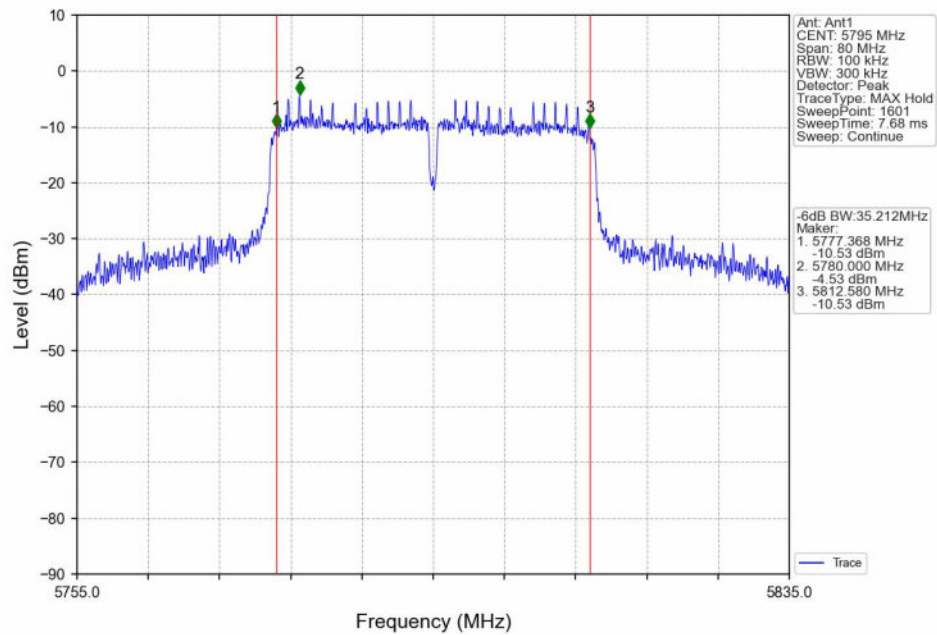


802.11ac(VHT40)_LCH_5755MHz_Ant1_NTNV

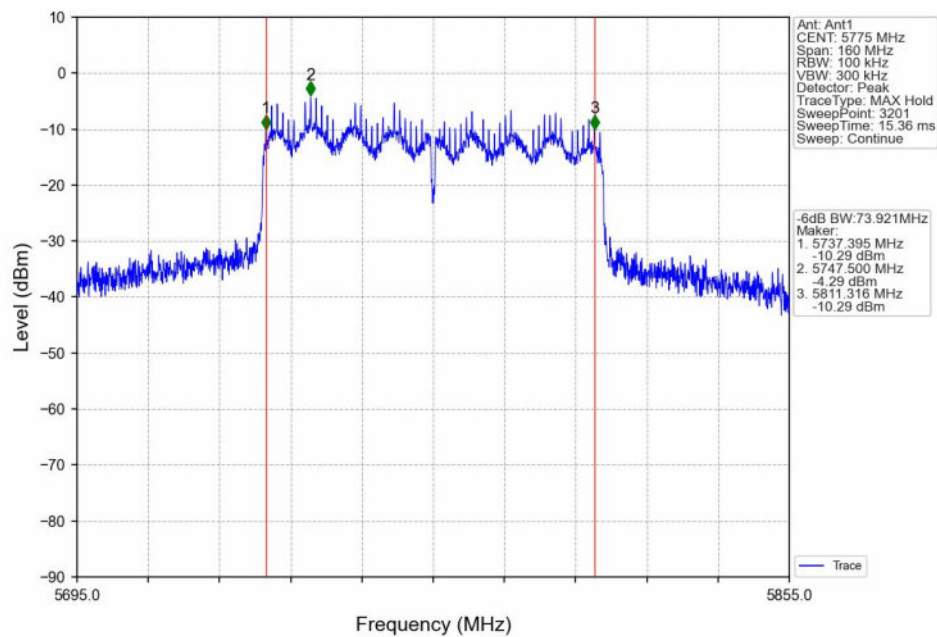




802.11ac(VHT40)_HCH_5795MHz_Ant1_NTNV



802.11ac(VHT80)_MCH_5775MHz_Ant1_NTNV





3. Maximum Conducted Output Power

3.1 Power

3.1.1 Test Result

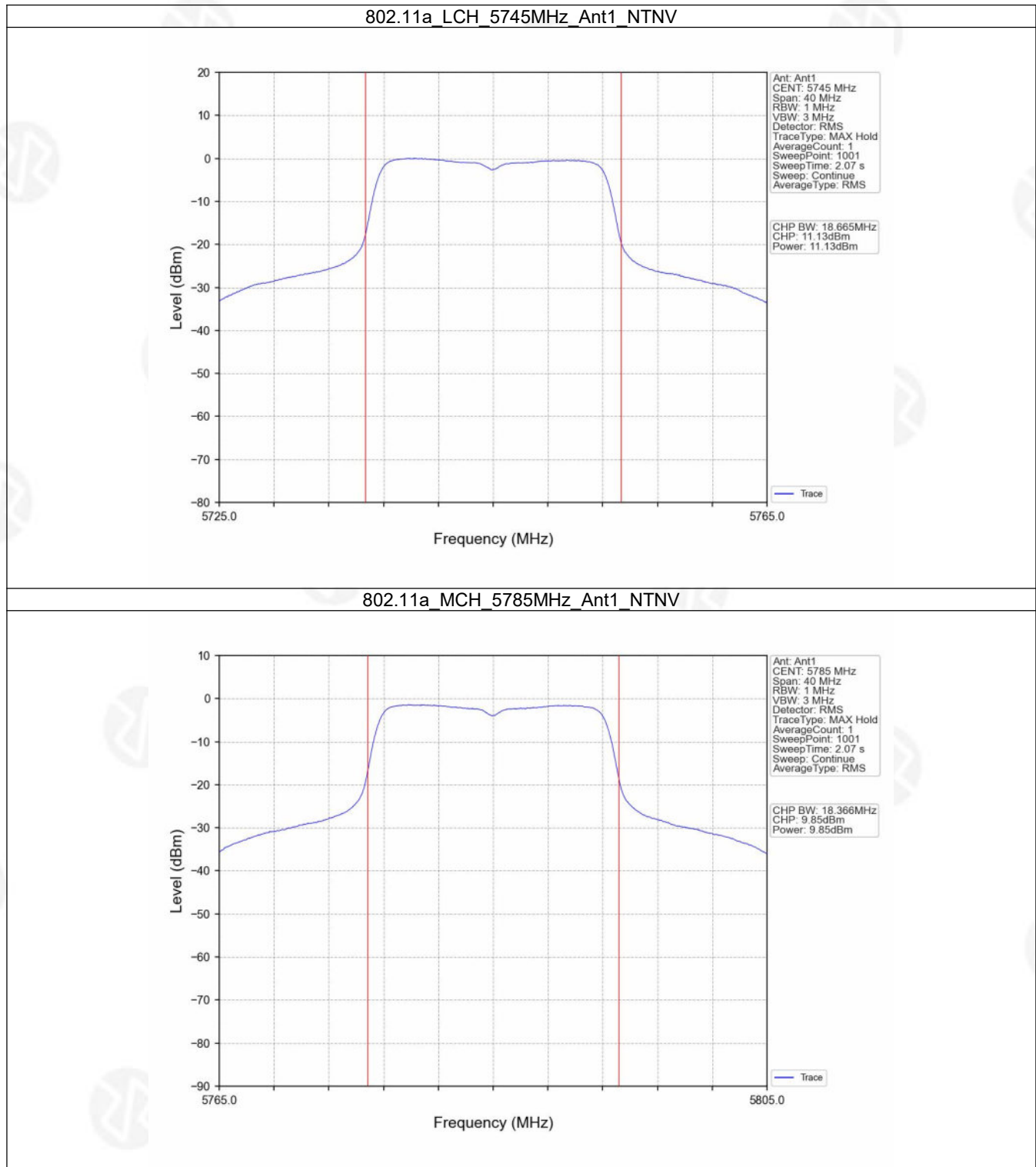
Mode	TX Type	Frequency (MHz)	Maximum Average Conducted Output Power (dBm)		Verdict
			ANT1	Limit	
802.11a	SISO	5745	11.13	<=30	Pass
		5785	9.85	<=30	Pass
		5825	9.22	<=30	Pass
802.11n (HT20)	SISO	5745	11.27	<=30	Pass
		5785	9.74	<=30	Pass
		5825	9.07	<=30	Pass
802.11n (HT40)	SISO	5755	10.79	<=30	Pass
		5795	9.76	<=30	Pass
802.11ac (VHT20)	SISO	5745	11.11	<=30	Pass
		5785	9.81	<=30	Pass
		5825	9.32	<=30	Pass
802.11ac (VHT40)	SISO	5755	10.92	<=30	Pass
		5795	9.43	<=30	Pass
802.11ac (VHT80)	SISO	5775	10.26	<=30	Pass

Note1: Antenna Gain: Ant1: 4.00dBi;

Note: The Duty Cycle Factor and RBW Factor is compensated in the graph.

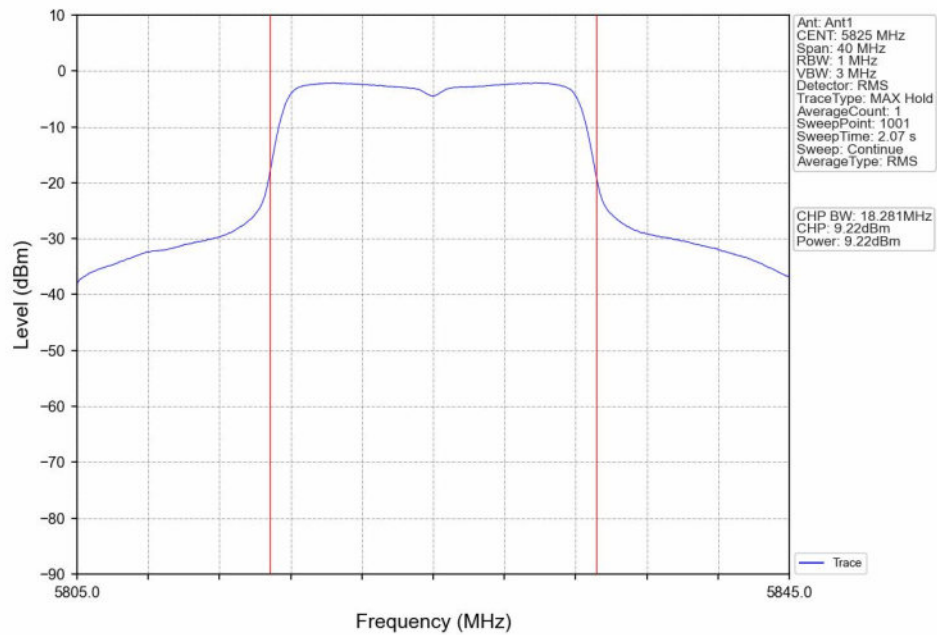


3.1.2 Test Graph

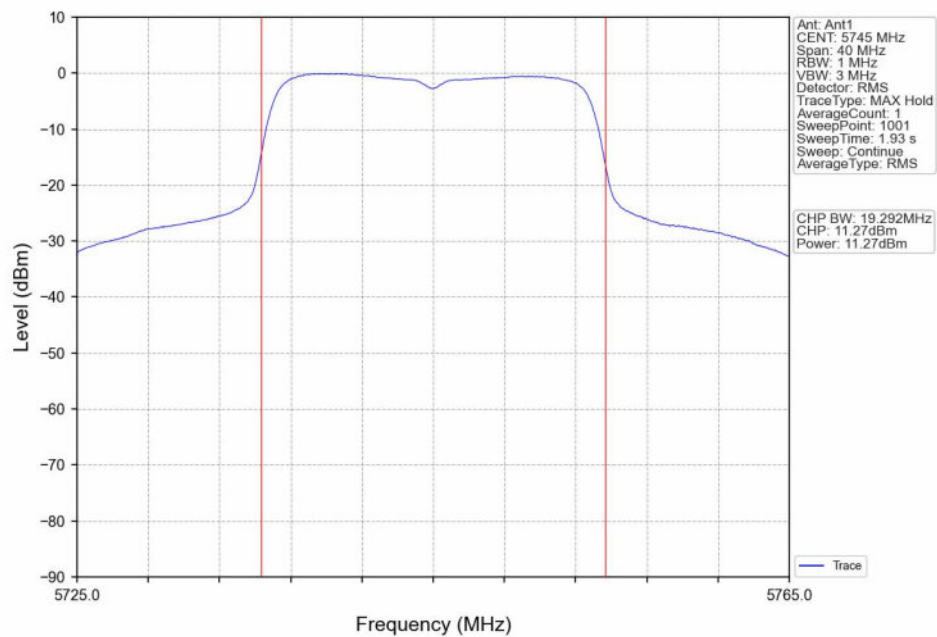




802.11a_HCH_5825MHz_Ant1_NTNV

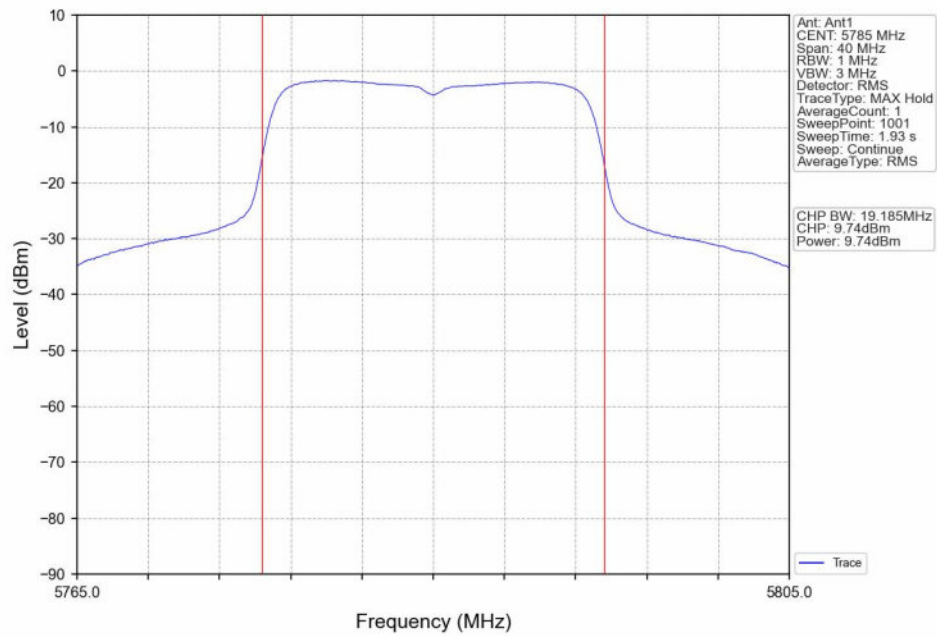


802.11n(HT20)_LCH_5745MHz_Ant1_NTNV

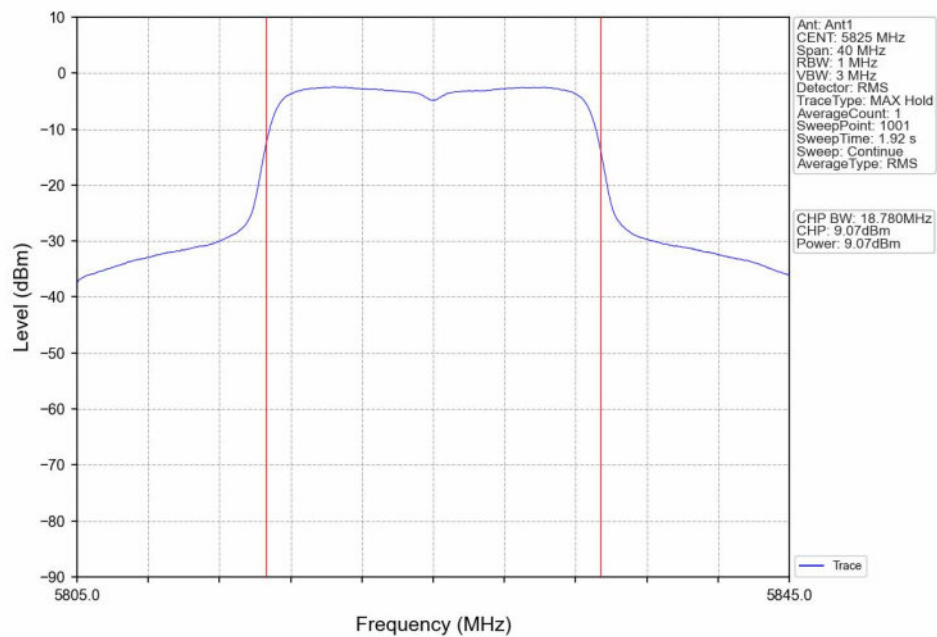




802.11n(HT20)_MCH_5785MHz_Ant1_NTNV

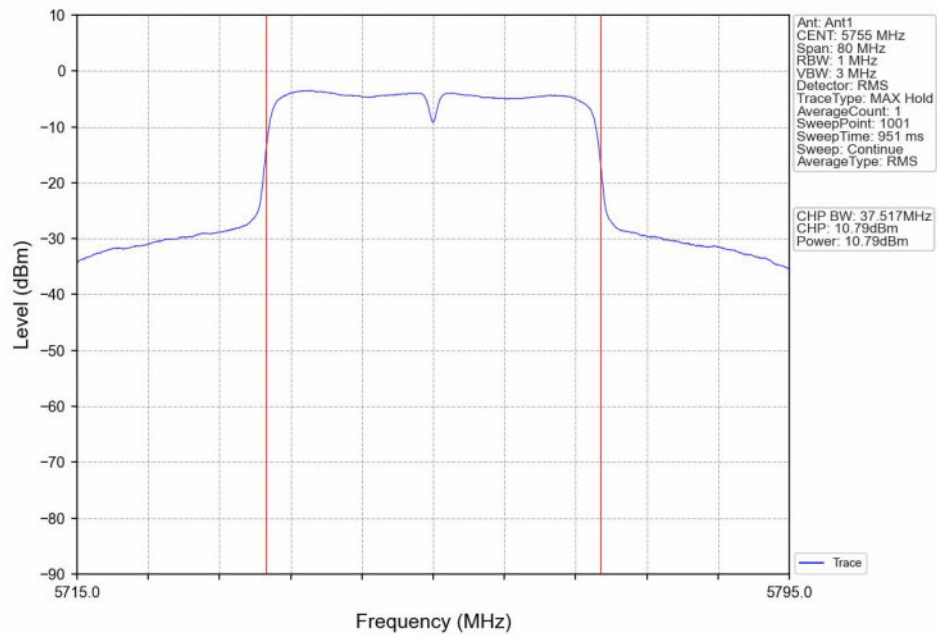


802.11n(HT20)_HCH_5825MHz_Ant1_NTNV

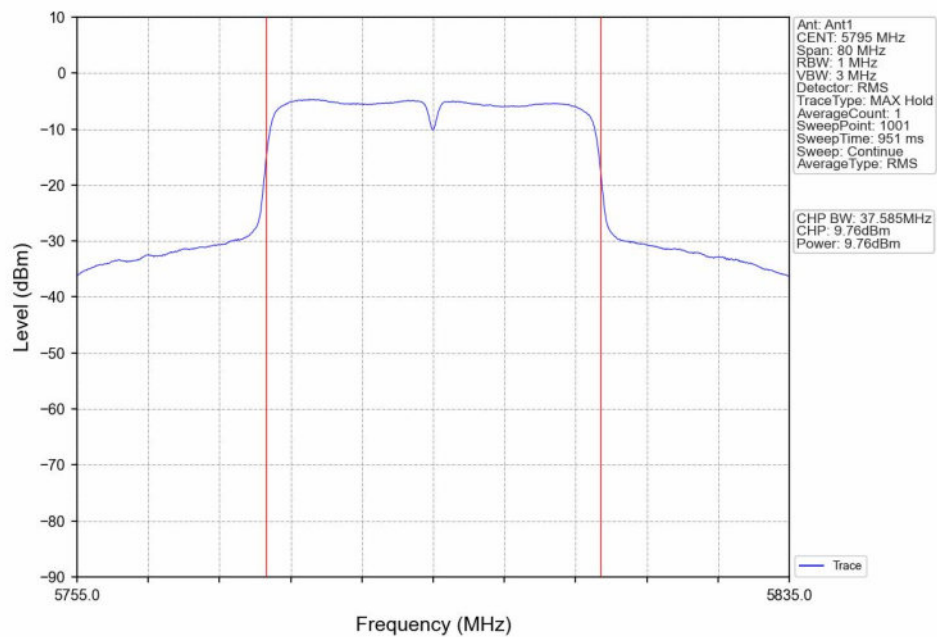




802.11n(HT40)_LCH_5755MHz_Ant1_NTNV

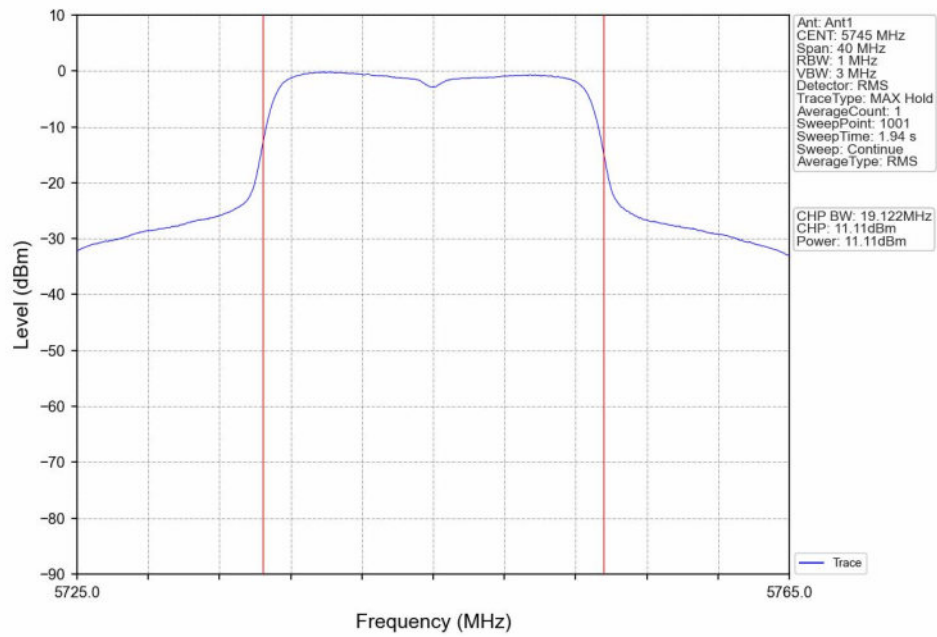


802.11n(HT40)_HCH_5795MHz_Ant1_NTNV

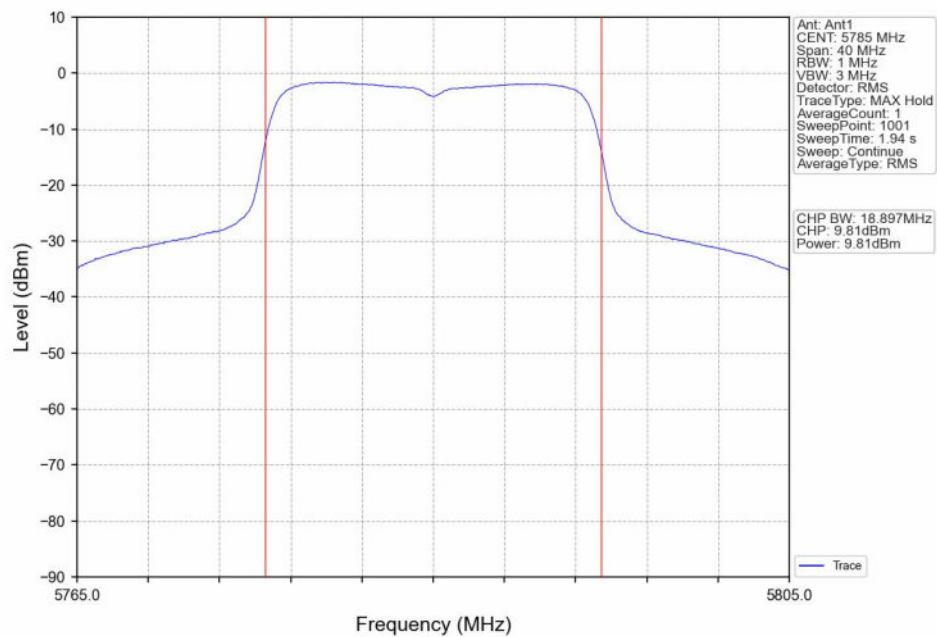




802.11ac(VHT20)_LCH_5745MHz_Ant1_NTNV

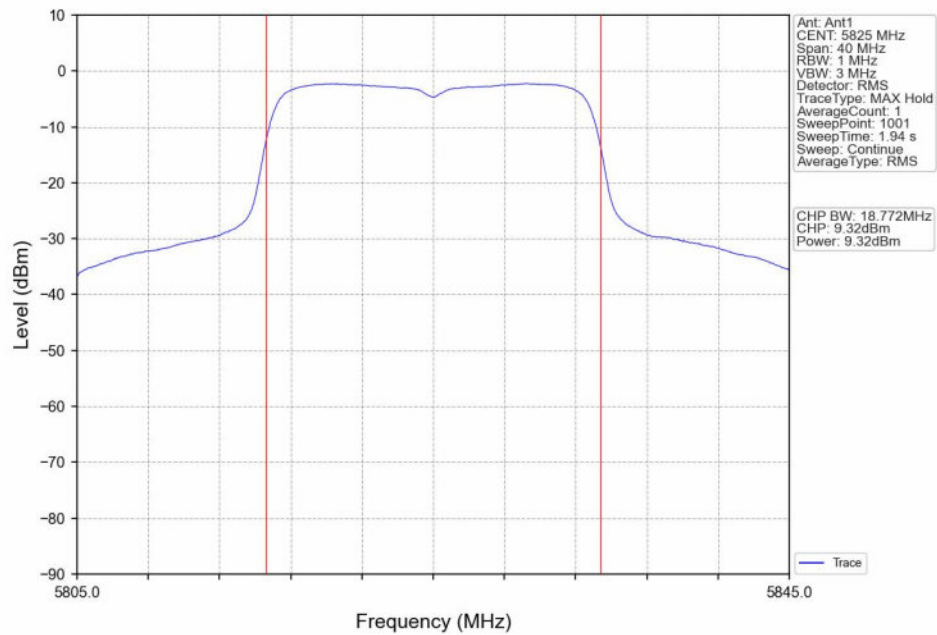


802.11ac(VHT20)_MCH_5785MHz_Ant1_NTNV

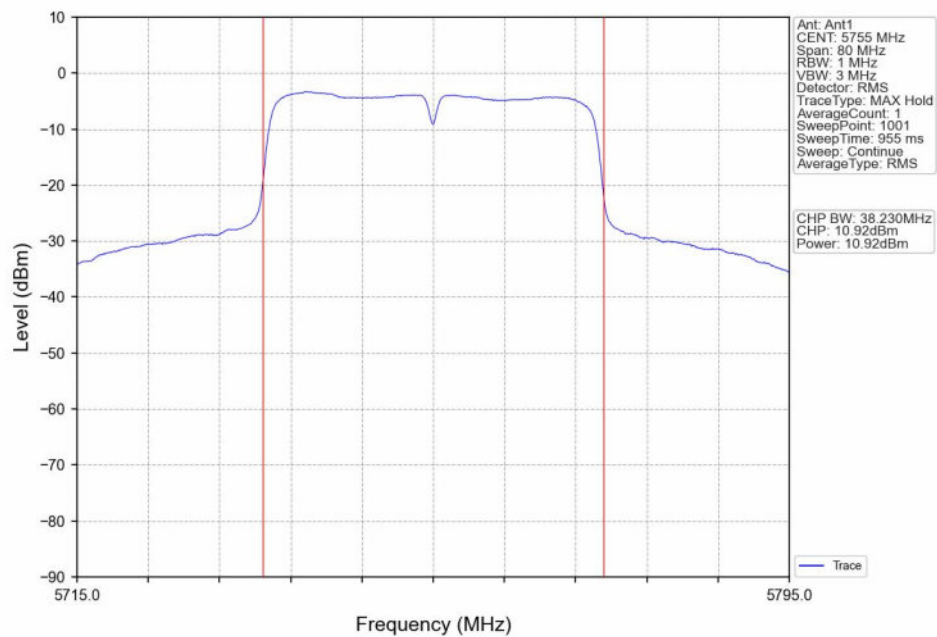




802.11ac(VHT20)_HCH_5825MHz_Ant1_NTNV

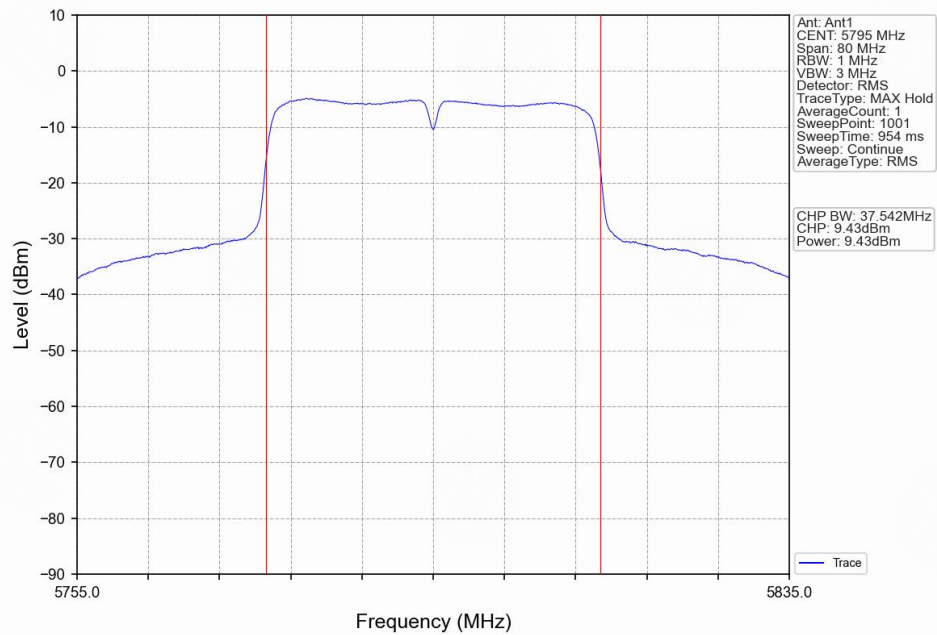


802.11ac(VHT40)_LCH_5755MHz_Ant1_NTNV

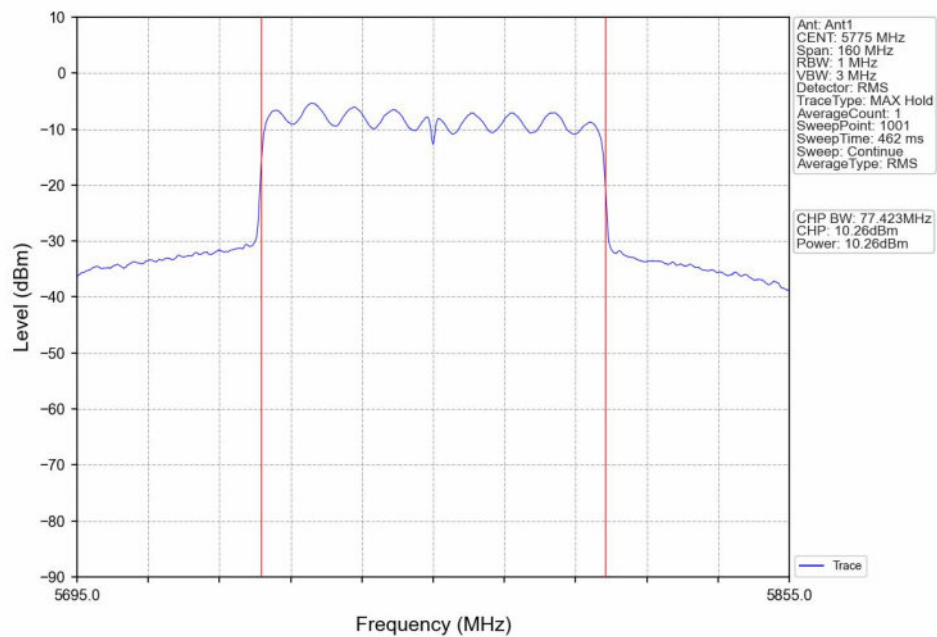




802.11ac(VHT40)_HCH_5795MHz_Ant1_NTNV



802.11ac(VHT80)_MCH_5775MHz_Ant1_NTNV





4. Maximum Power Spectral Density

4.1 PSD-Band3

4.1.1 Test Result

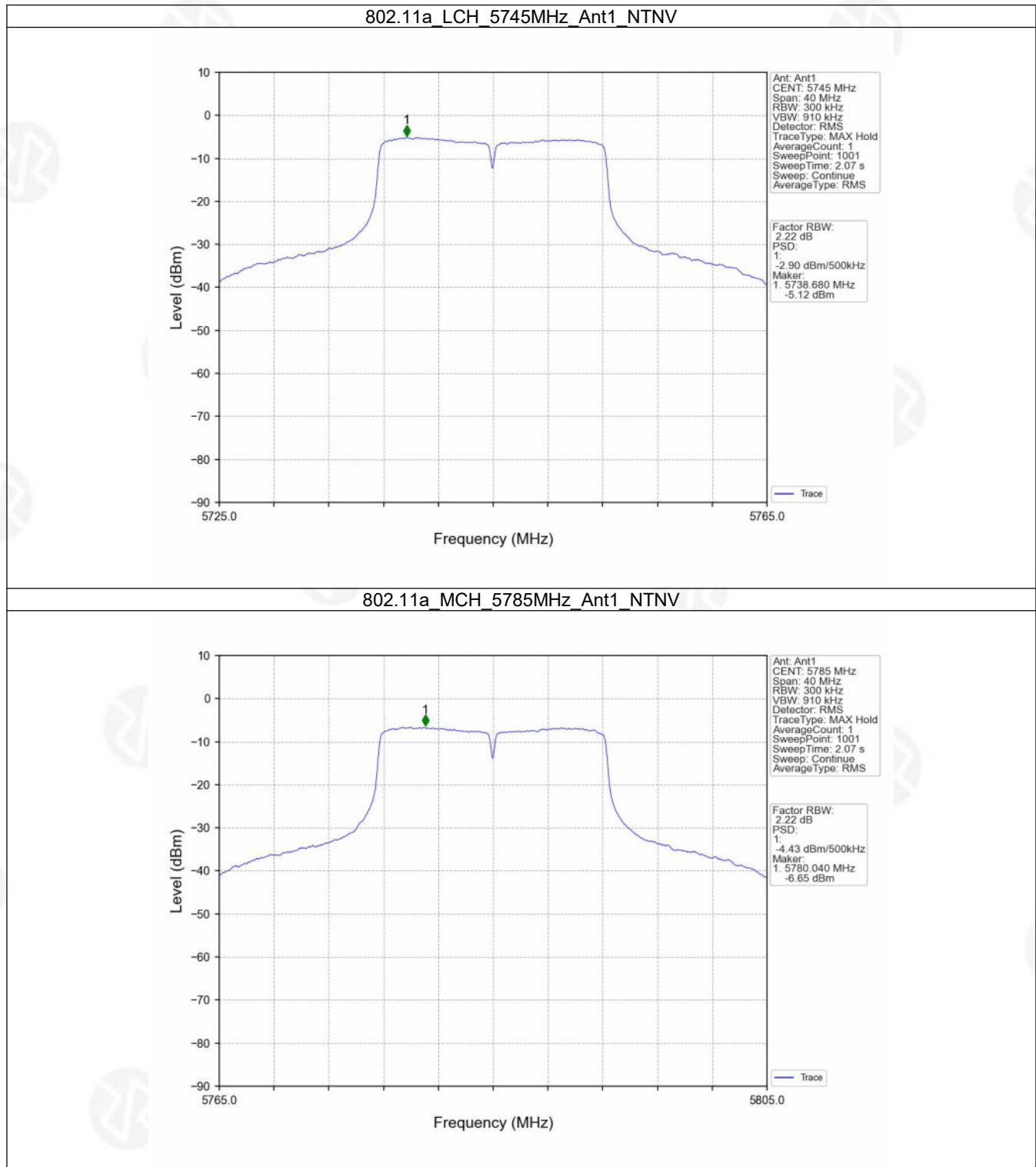
Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm/500kHz)		Verdict
			ANT1	Limit	
802.11a	SISO	5745	-2.90	<=30	Pass
		5785	-4.43	<=30	Pass
		5825	-4.97	<=30	Pass
802.11n (HT20)	SISO	5745	-3.06	<=30	Pass
		5785	-4.68	<=30	Pass
		5825	-5.24	<=30	Pass
802.11n (HT40)	SISO	5755	-6.37	<=30	Pass
		5795	-7.43	<=30	Pass
802.11ac (VHT20)	SISO	5745	-3.09	<=30	Pass
		5785	-4.41	<=30	Pass
		5825	-5.05	<=30	Pass
802.11ac (VHT40)	SISO	5755	-6.19	<=30	Pass
		5795	-7.63	<=30	Pass
802.11ac (VHT80)	SISO	5775	-7.85	<=30	Pass

Note1: Antenna Gain: Ant1: 4.00dBi;

Note: The Duty Cycle Factor and RBW Factor is compensated in the graph.

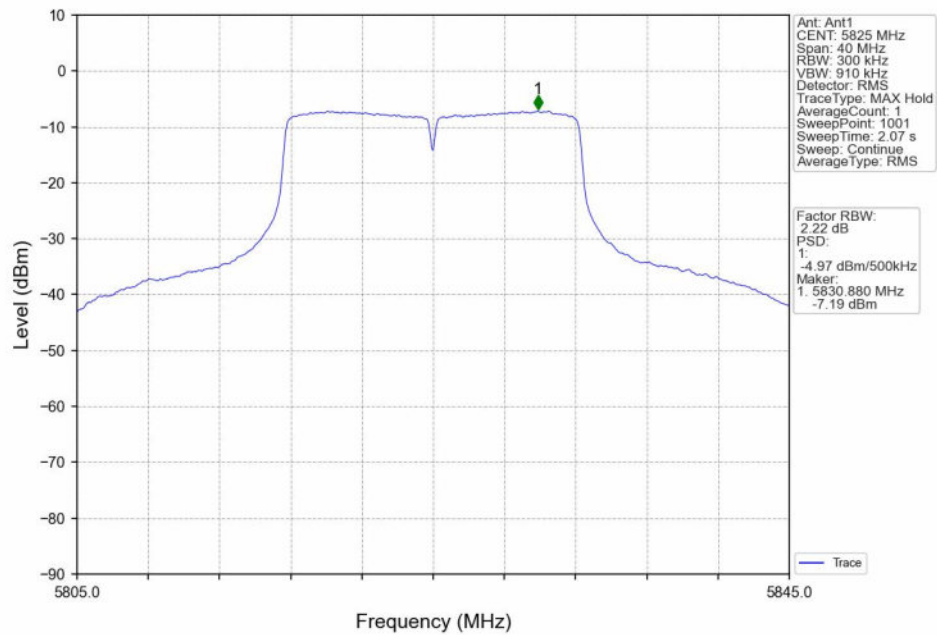


4.1.2 Test Graph

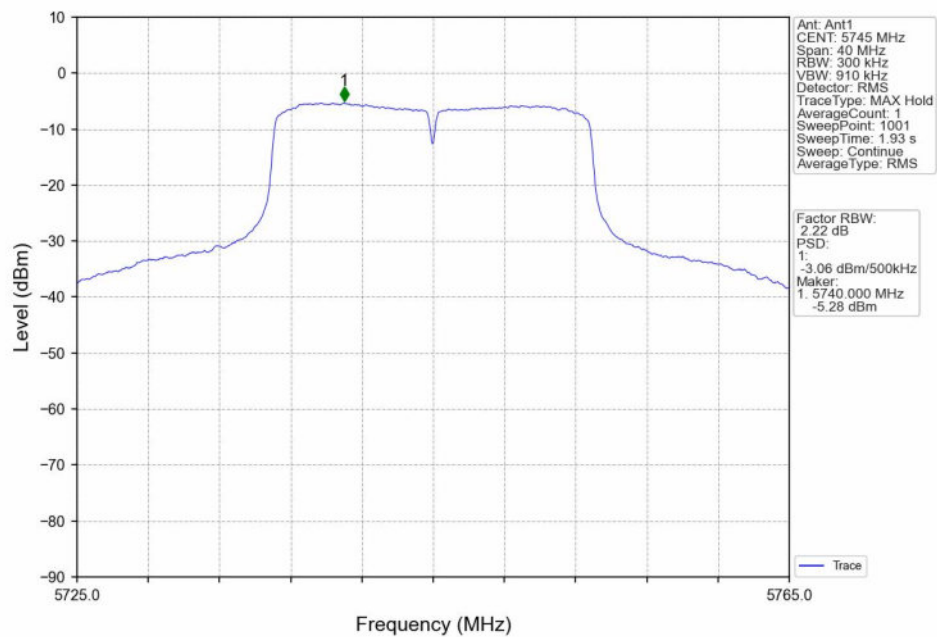




802.11a_HCH_5825MHz_Ant1_NTNV

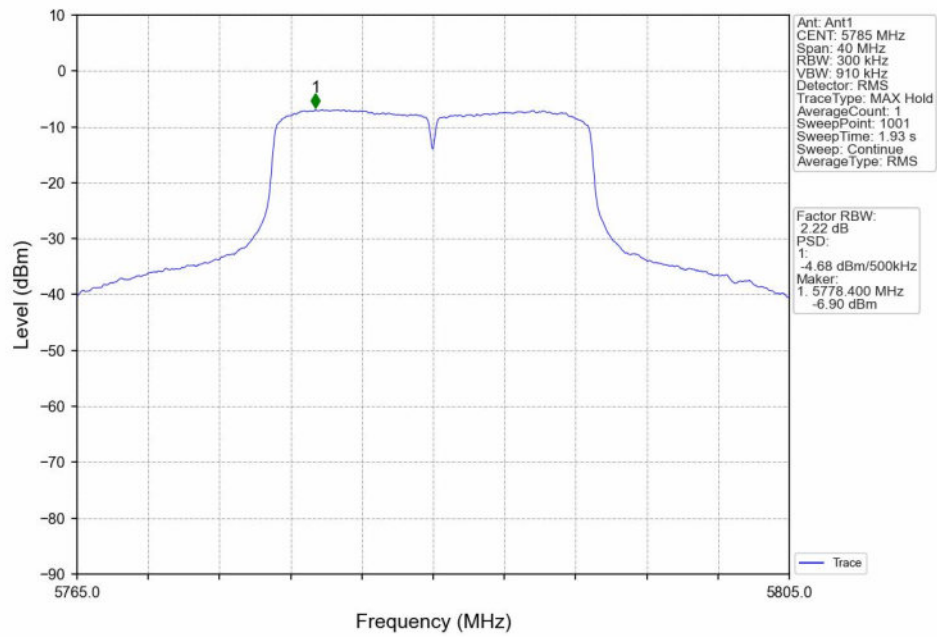


802.11n(HT20)_LCH_5745MHz_Ant1_NTNV

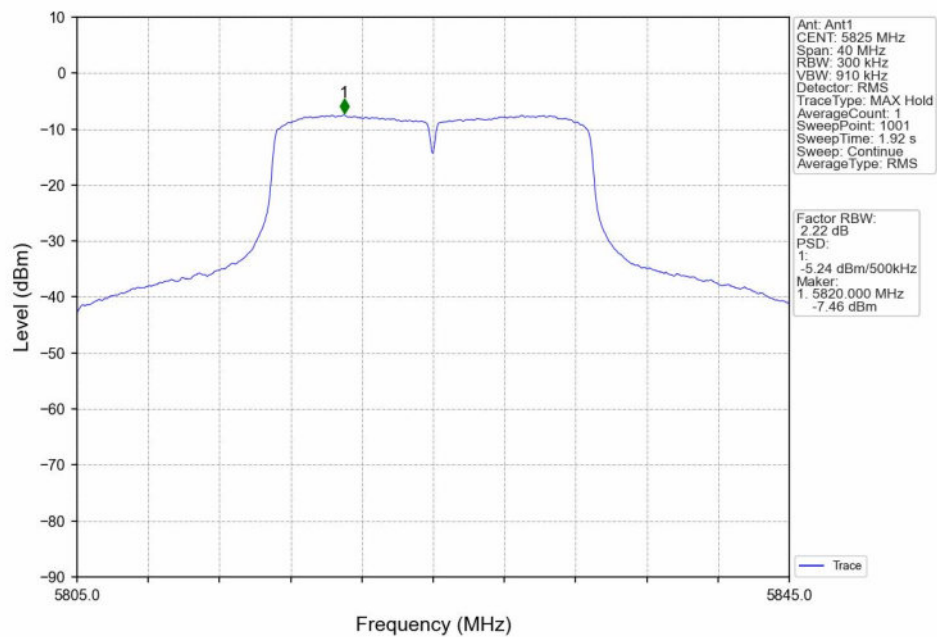




802.11n(HT20)_MCH_5785MHz_Ant1_NTNV

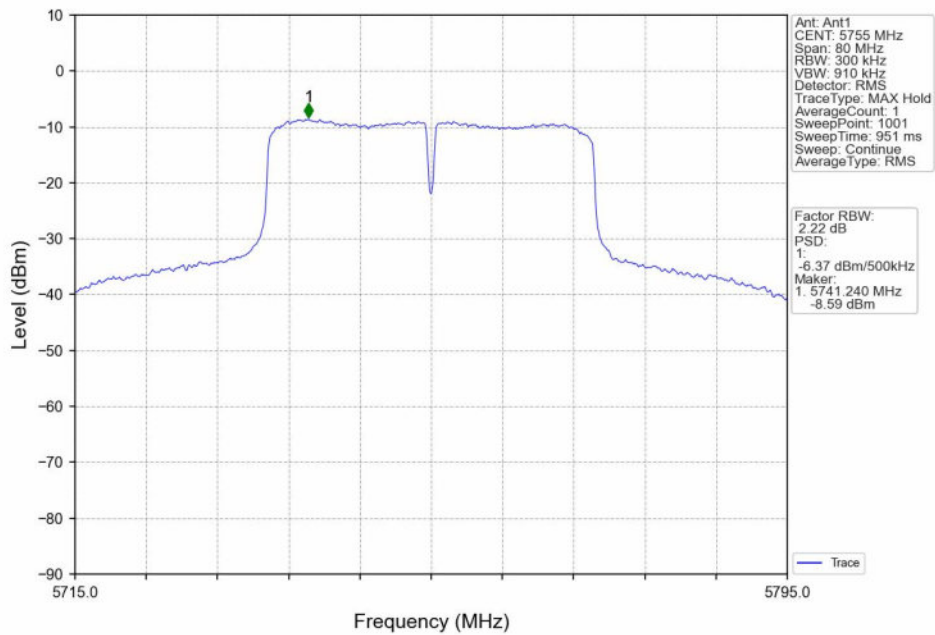


802.11n(HT20)_HCH_5825MHz_Ant1_NTNV

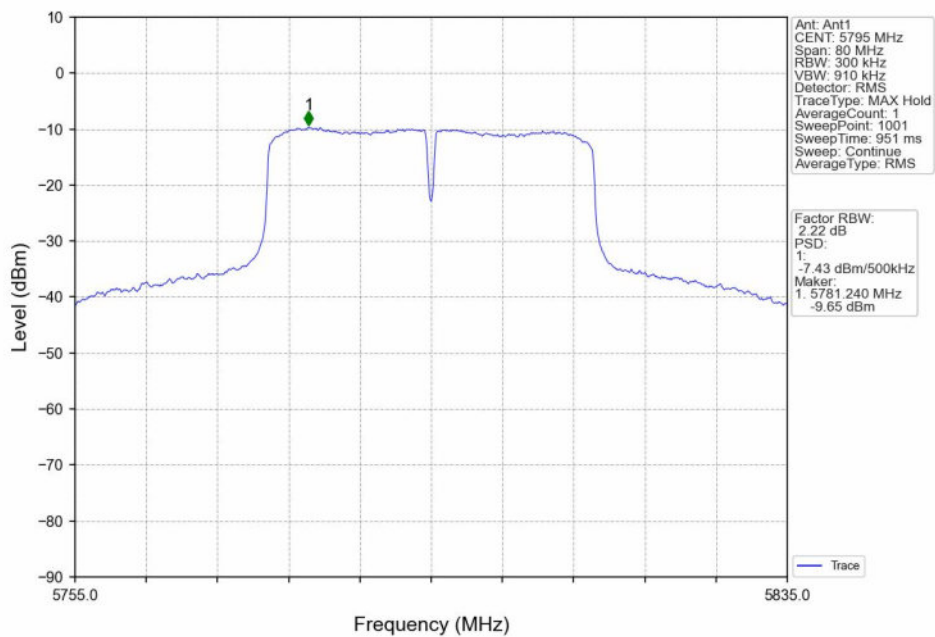




802.11n(HT40)_LCH_5755MHz_Ant1_NTNV

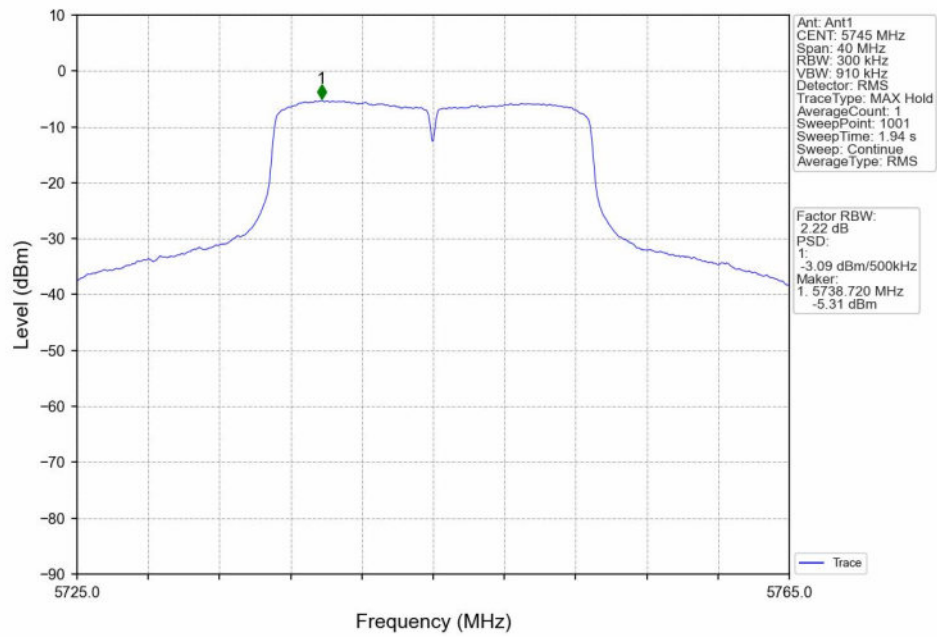


802.11n(HT40)_HCH_5795MHz_Ant1_NTNV

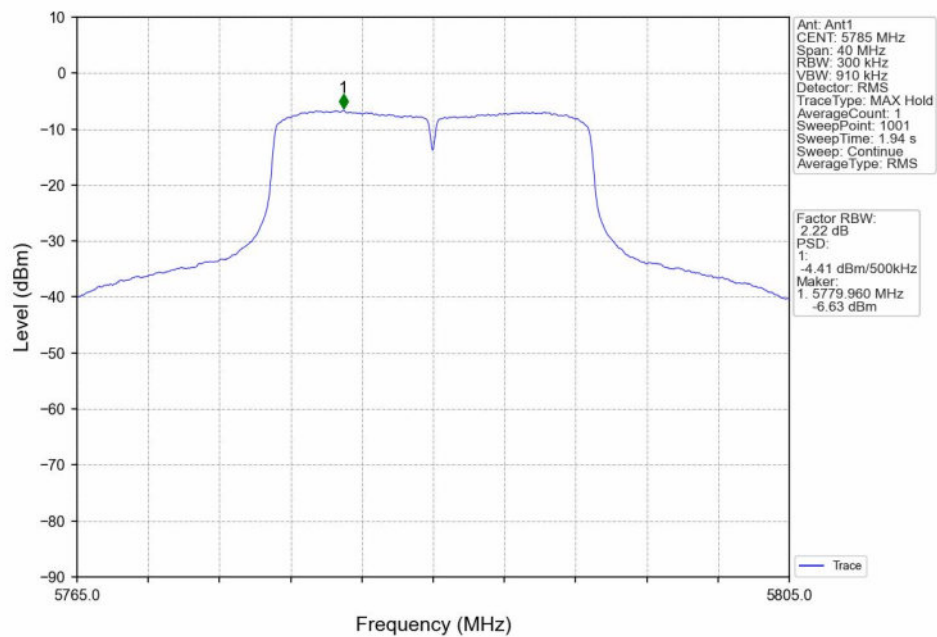




802.11ac(VHT20)_LCH_5745MHz_Ant1_NTNV

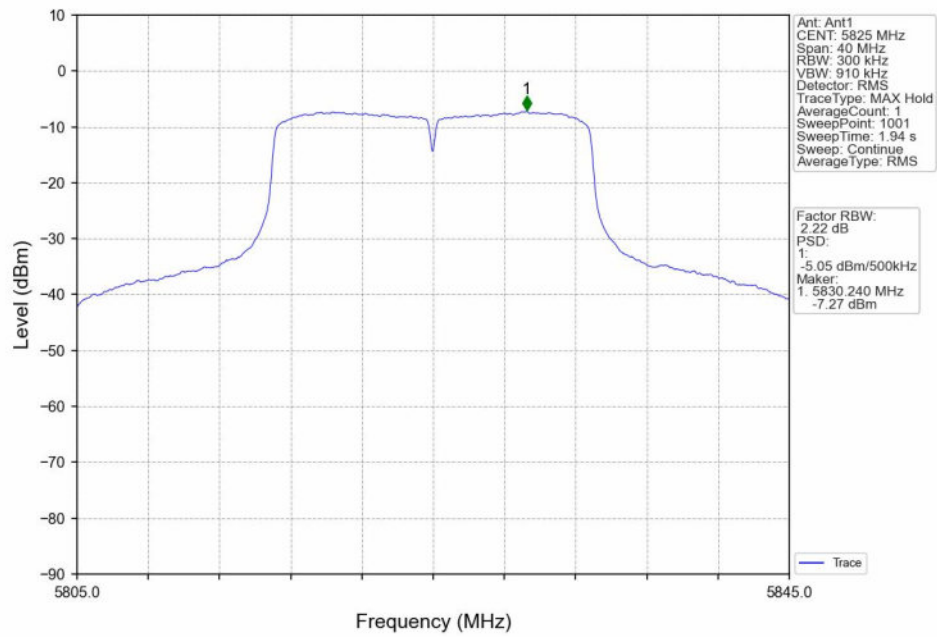


802.11ac(VHT20)_MCH_5785MHz_Ant1_NTNV

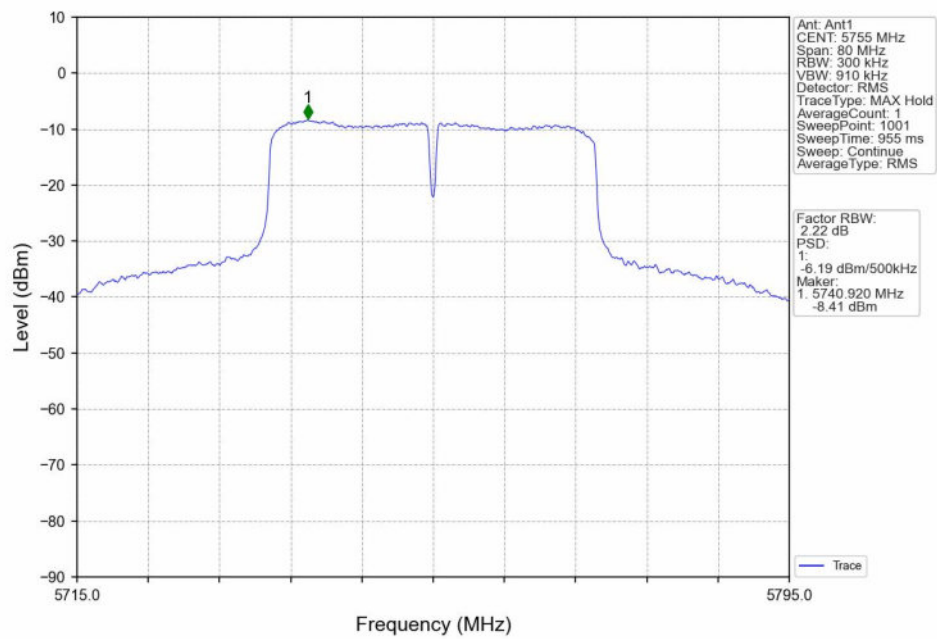




802.11ac(VHT20)_HCH_5825MHz_Ant1_NTNV

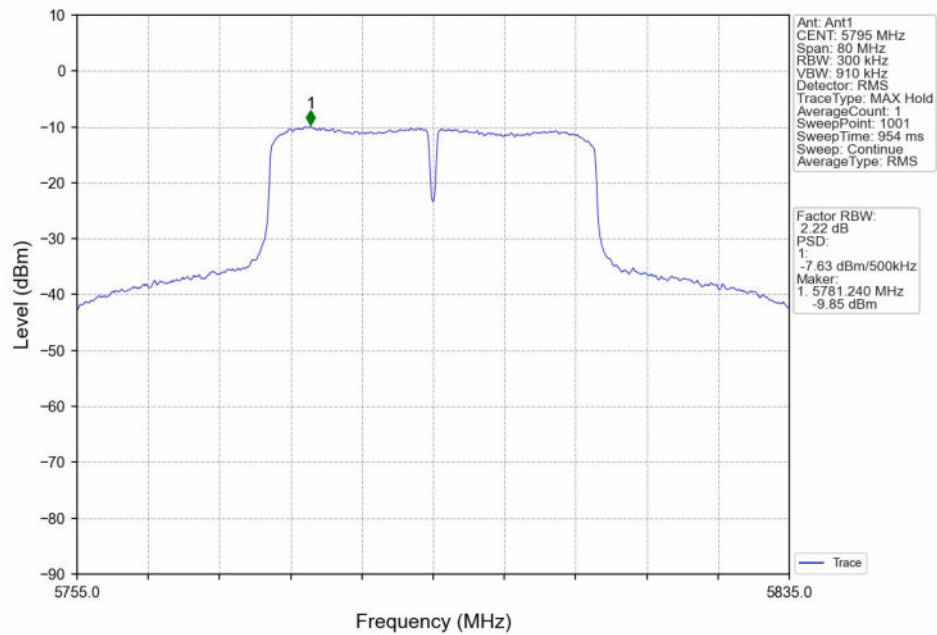


802.11ac(VHT40)_LCH_5755MHz_Ant1_NTNV

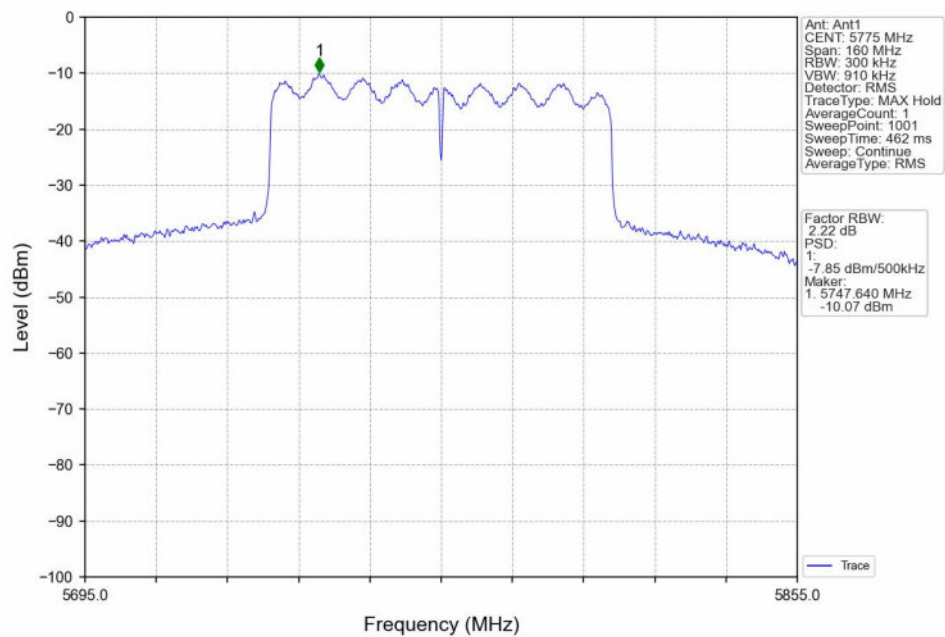




802.11ac(VHT40)_HCH_5795MHz_Ant1_NTNV



802.11ac(VHT80)_MCH_5775MHz_Ant1_NTNV





5. Frequency Stability

5.1 Ant1

5.1.1 Test Result

Ant1							
Mode	TX Type	Frequency (MHz)	Temperature (°C)	Voltage (VAC)	Measured Frequency (MHz)	Limit (MHz)	Verdict
802.11a	SISO	5745	20	102	5744.920	5725 to 5850	Pass
				120	5744.960	5725 to 5850	Pass
				138	5744.920	5725 to 5850	Pass
			-30	120	5744.960	5725 to 5850	Pass
			-20	120	5744.960	5725 to 5850	Pass
			-10	120	5744.940	5725 to 5850	Pass
			0	120	5744.920	5725 to 5850	Pass
			10	120	5744.960	5725 to 5850	Pass
			30	120	5744.940	5725 to 5850	Pass
			40	120	5744.920	5725 to 5850	Pass
			50	120	5744.960	5725 to 5850	Pass
		5785	20	102	5784.980	5725 to 5850	Pass
				120	5784.980	5725 to 5850	Pass
				138	5785.020	5725 to 5850	Pass
			-30	120	5784.960	5725 to 5850	Pass
			-20	120	5784.940	5725 to 5850	Pass
			-10	120	5784.980	5725 to 5850	Pass
			0	120	5784.920	5725 to 5850	Pass
			10	120	5785.020	5725 to 5850	Pass
			30	120	5784.980	5725 to 5850	Pass
			40	120	5785.000	5725 to 5850	Pass
			50	120	5784.980	5725 to 5850	Pass
		5825	20	102	5824.980	5725 to 5850	Pass
				120	5825.000	5725 to 5850	Pass
				138	5825.000	5725 to 5850	Pass
			-30	120	5824.980	5725 to 5850	Pass
			-20	120	5824.960	5725 to 5850	Pass
			-10	120	5824.980	5725 to 5850	Pass
			0	120	5824.980	5725 to 5850	Pass
			10	120	5825.000	5725 to 5850	Pass
			30	120	5825.000	5725 to 5850	Pass
			40	120	5824.980	5725 to 5850	Pass
			50	120	5824.960	5725 to 5850	Pass
802.11n (HT20)	SISO	5745	20	102	5745.020	5725 to 5850	Pass
				120	5744.980	5725 to 5850	Pass
				138	5744.940	5725 to 5850	Pass
			-30	120	5745.020	5725 to 5850	Pass
			-20	120	5744.980	5725 to 5850	Pass
			-10	120	5745.000	5725 to 5850	Pass
			0	120	5745.000	5725 to 5850	Pass
			10	120	5744.960	5725 to 5850	Pass
			30	120	5744.980	5725 to 5850	Pass
			40	120	5744.980	5725 to 5850	Pass
			50	120	5744.940	5725 to 5850	Pass
		5785	20	102	5785.000	5725 to 5850	Pass
				120	5784.980	5725 to 5850	Pass



				138	5784.960	5725 to 5850	Pass
			-30	120	5784.980	5725 to 5850	Pass
			-20	120	5785.000	5725 to 5850	Pass
			-10	120	5784.980	5725 to 5850	Pass
			0	120	5784.940	5725 to 5850	Pass
			10	120	5784.980	5725 to 5850	Pass
			30	120	5784.980	5725 to 5850	Pass
			40	120	5784.960	5725 to 5850	Pass
			50	120	5784.900	5725 to 5850	Pass
		5825	20	102	5824.940	5725 to 5850	Pass
				120	5825.000	5725 to 5850	Pass
				138	5824.940	5725 to 5850	Pass
			-30	120	5825.000	5725 to 5850	Pass
			-20	120	5824.980	5725 to 5850	Pass
			-10	120	5825.000	5725 to 5850	Pass
			0	120	5825.040	5725 to 5850	Pass
			10	120	5825.040	5725 to 5850	Pass
			30	120	5824.940	5725 to 5850	Pass
			40	120	5825.000	5725 to 5850	Pass
			50	120	5824.980	5725 to 5850	Pass
802.11n (HT40)	SISO	5755	20	102	5754.960	5725 to 5850	Pass
				120	5754.920	5725 to 5850	Pass
				138	5754.920	5725 to 5850	Pass
			-30	120	5754.920	5725 to 5850	Pass
			-20	120	5755.000	5725 to 5850	Pass
			-10	120	5754.920	5725 to 5850	Pass
			0	120	5755.000	5725 to 5850	Pass
			10	120	5754.960	5725 to 5850	Pass
			30	120	5754.920	5725 to 5850	Pass
			40	120	5754.960	5725 to 5850	Pass
			50	120	5755.000	5725 to 5850	Pass
		5795	20	102	5795.000	5725 to 5850	Pass
				120	5794.960	5725 to 5850	Pass
				138	5794.960	5725 to 5850	Pass
			-30	120	5795.000	5725 to 5850	Pass
			-20	120	5795.000	5725 to 5850	Pass
			-10	120	5795.000	5725 to 5850	Pass
			0	120	5795.000	5725 to 5850	Pass
			10	120	5794.960	5725 to 5850	Pass
802.11ac (VHT20)	SISO	5745	20	102	5744.980	5725 to 5850	Pass
				120	5744.900	5725 to 5850	Pass
				138	5744.920	5725 to 5850	Pass
			-30	120	5745.000	5725 to 5850	Pass
			-20	120	5744.980	5725 to 5850	Pass
			-10	120	5744.980	5725 to 5850	Pass
			0	120	5744.900	5725 to 5850	Pass
			10	120	5744.940	5725 to 5850	Pass
			30	120	5744.900	5725 to 5850	Pass
			40	120	5744.940	5725 to 5850	Pass
			50	120	5744.960	5725 to 5850	Pass
		5785	20	102	5784.920	5725 to 5850	Pass
				120	5784.940	5725 to 5850	Pass
				138	5784.940	5725 to 5850	Pass
			-30	120	5785.000	5725 to 5850	Pass
			-20	120	5784.960	5725 to 5850	Pass
			-10	120	5784.900	5725 to 5850	Pass



			0	120	5784.960	5725 to 5850	Pass
			10	120	5784.960	5725 to 5850	Pass
			30	120	5785.000	5725 to 5850	Pass
			40	120	5784.940	5725 to 5850	Pass
			50	120	5784.920	5725 to 5850	Pass
		5825	20	102	5824.920	5725 to 5850	Pass
				120	5824.980	5725 to 5850	Pass
				138	5824.940	5725 to 5850	Pass
			-30	120	5824.980	5725 to 5850	Pass
			-20	120	5824.960	5725 to 5850	Pass
			-10	120	5824.920	5725 to 5850	Pass
			0	120	5825.000	5725 to 5850	Pass
			10	120	5824.980	5725 to 5850	Pass
			30	120	5824.980	5725 to 5850	Pass
			40	120	5824.940	5725 to 5850	Pass
			50	120	5824.940	5725 to 5850	Pass
		5755	20	102	5754.840	5725 to 5850	Pass
				120	5754.920	5725 to 5850	Pass
				138	5754.960	5725 to 5850	Pass
			-30	120	5754.920	5725 to 5850	Pass
			-20	120	5754.840	5725 to 5850	Pass
			-10	120	5754.920	5725 to 5850	Pass
			0	120	5754.960	5725 to 5850	Pass
			10	120	5754.920	5725 to 5850	Pass
			30	120	5754.960	5725 to 5850	Pass
			40	120	5754.840	5725 to 5850	Pass
			50	120	5754.840	5725 to 5850	Pass
		5795	20	102	5795.000	5725 to 5850	Pass
				120	5794.960	5725 to 5850	Pass
				138	5795.000	5725 to 5850	Pass
			-30	120	5795.040	5725 to 5850	Pass
			-20	120	5795.000	5725 to 5850	Pass
			-10	120	5795.000	5725 to 5850	Pass
			0	120	5795.000	5725 to 5850	Pass
			10	120	5795.000	5725 to 5850	Pass
			30	120	5795.000	5725 to 5850	Pass
			40	120	5794.960	5725 to 5850	Pass
			50	120	5795.000	5725 to 5850	Pass
802.11ac (VHT40)	SISO	5775	20	102	5774.850	5725 to 5850	Pass
				120	5774.850	5725 to 5850	Pass
				138	5774.925	5725 to 5850	Pass
			-30	120	5774.925	5725 to 5850	Pass
			-20	120	5774.850	5725 to 5850	Pass
			-10	120	5774.850	5725 to 5850	Pass
			0	120	5774.850	5725 to 5850	Pass
			10	120	5774.925	5725 to 5850	Pass
			30	120	5774.850	5725 to 5850	Pass
			40	120	5774.850	5725 to 5850	Pass
			50	120	5774.850	5725 to 5850	Pass
			50	120	5774.850	5725 to 5850	Pass



6. Form731

6.1 Form731

6.1.1 Test Result

Lower Freq (MHz)	High Freq (MHz)	MAX Power (W)	MAX Power (dBm)
5745	5825	0.0134	11.27
5755	5795	0.0124	10.92
5775	5775	0.0106	10.26