



RF Test Report

For

Project No.:	ZKT-240801L9141E-5
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
Unwanted Emissions In Non-restricted Frequency Bands	Pass
Frequency Error	Pass
Form731	Pass



1. Duty Cycle

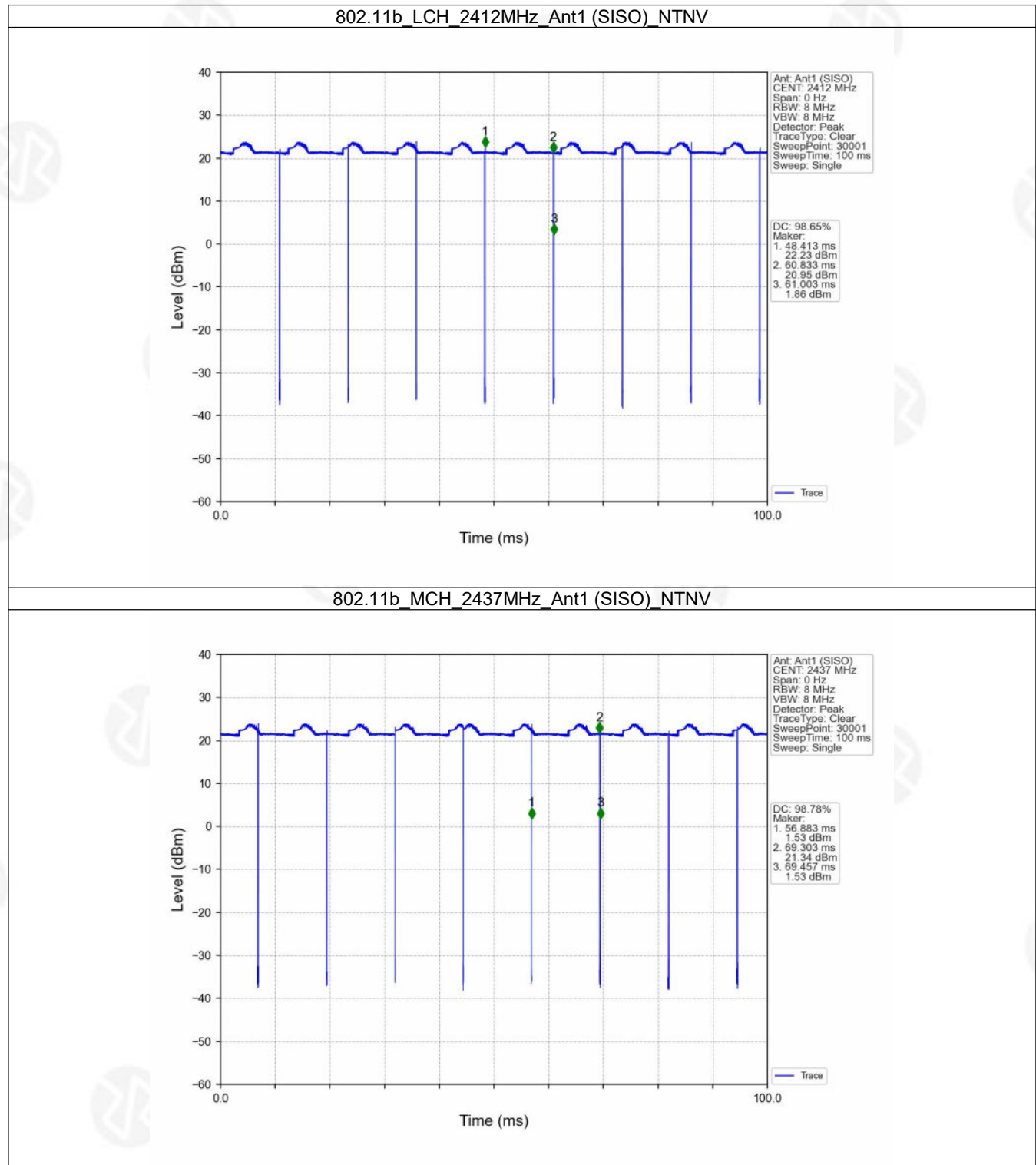
1.1 Ant1

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 (%)
802.11b	SISO	2412	12.420	12.590	98.65	0.06	0.92
		2437	12.420	12.574	98.78	0.05	0.93
		2462	12.420	14.346	86.57	0.63	12.58
802.11g	SISO	2412	2.072	2.228	93.00	0.32	5.60
		2437	2.066	2.237	92.36	0.35	5.91
		2462	2.074	2.192	94.62	0.24	3.21
802.11n (HT20)	SISO	2412	1.928	2.048	94.14	0.26	4.30
		2437	1.928	2.084	92.51	0.34	5.92
		2462	1.928	2.093	92.12	0.36	6.32
802.11n (HT40)	SISO	2422	0.952	1.100	86.55	0.63	10.34
		2437	0.951	1.117	85.14	0.70	11.71
		2452	0.952	2.659	35.80	4.46	61.07

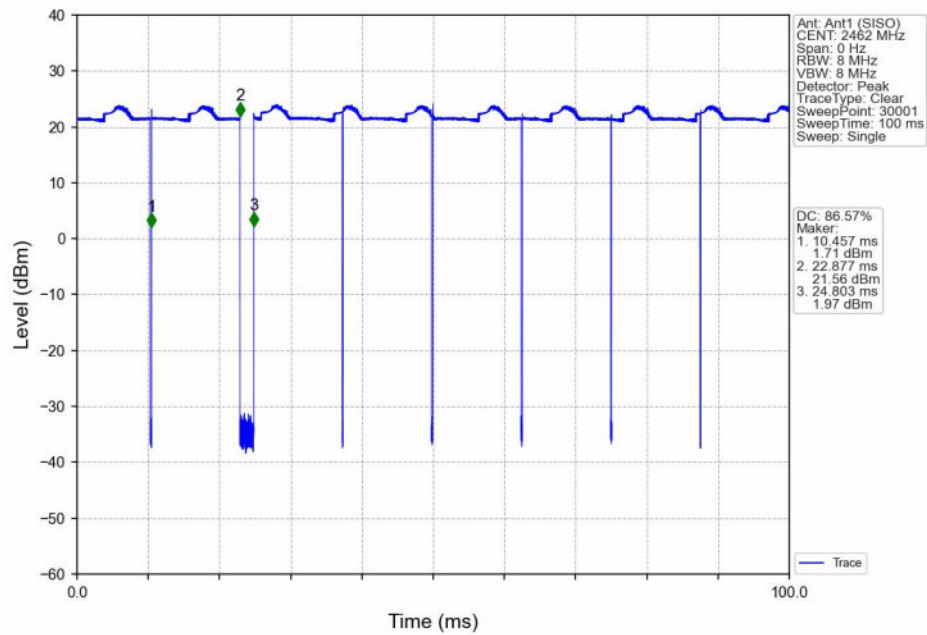


1.1.2 Test Graph

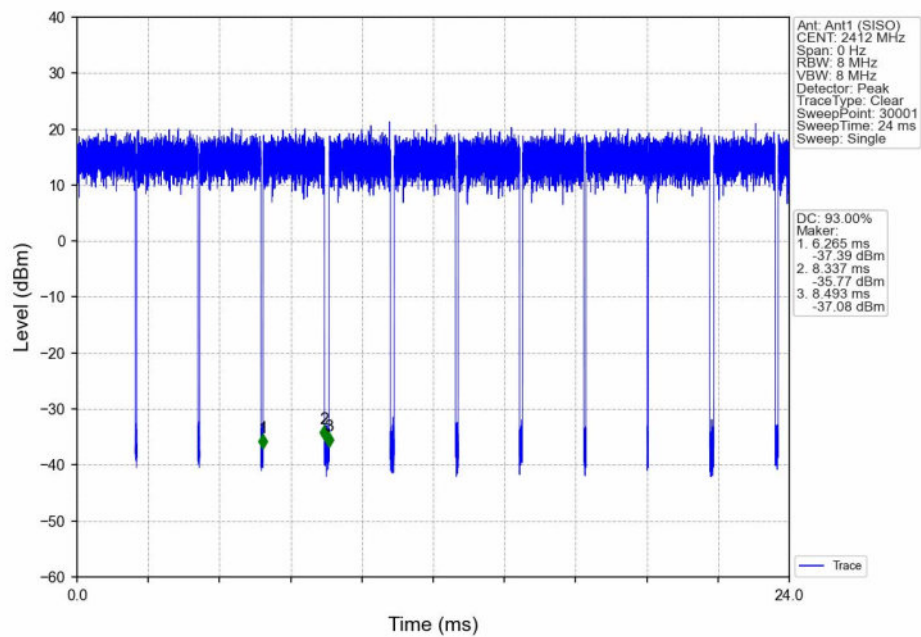




802.11b_HCH_2462MHz_Ant1 (SISO)_NTNV

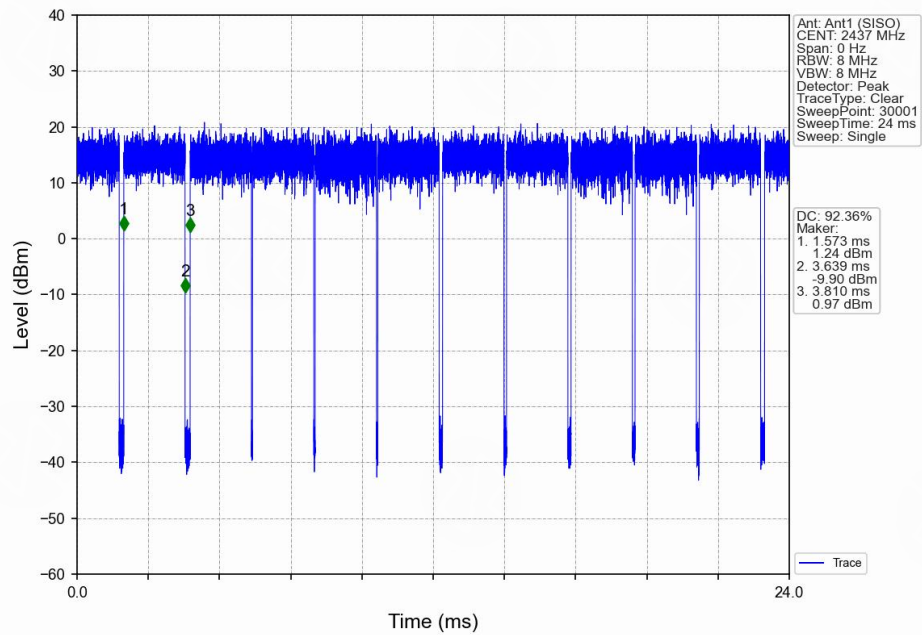


802.11g_LCH_2412MHz_Ant1 (SISO)_NTNV

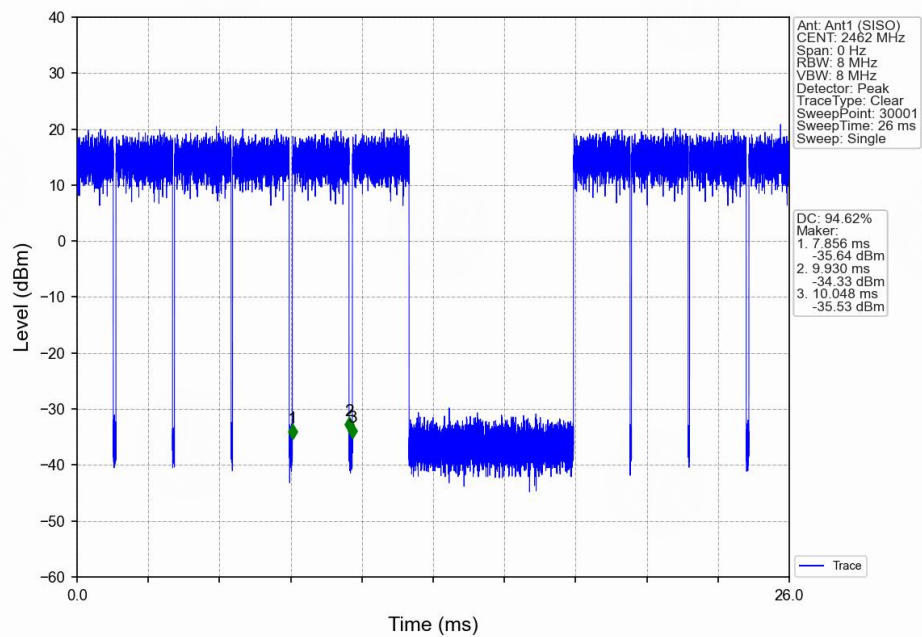




802.11g_MCH_2437MHz_Ant1 (SISO)_NTNV

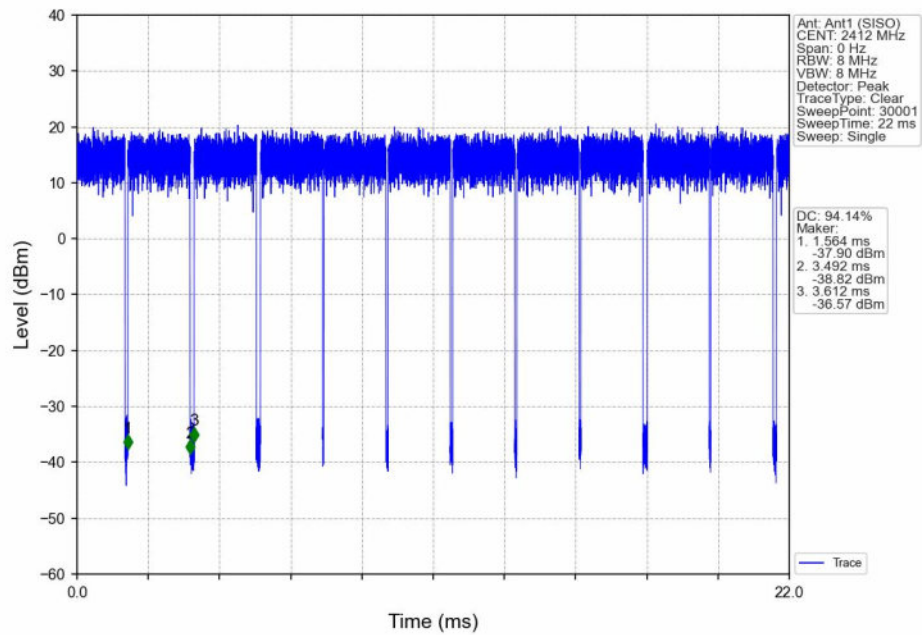


802.11g_HCH_2462MHz_Ant1 (SISO)_NTNV

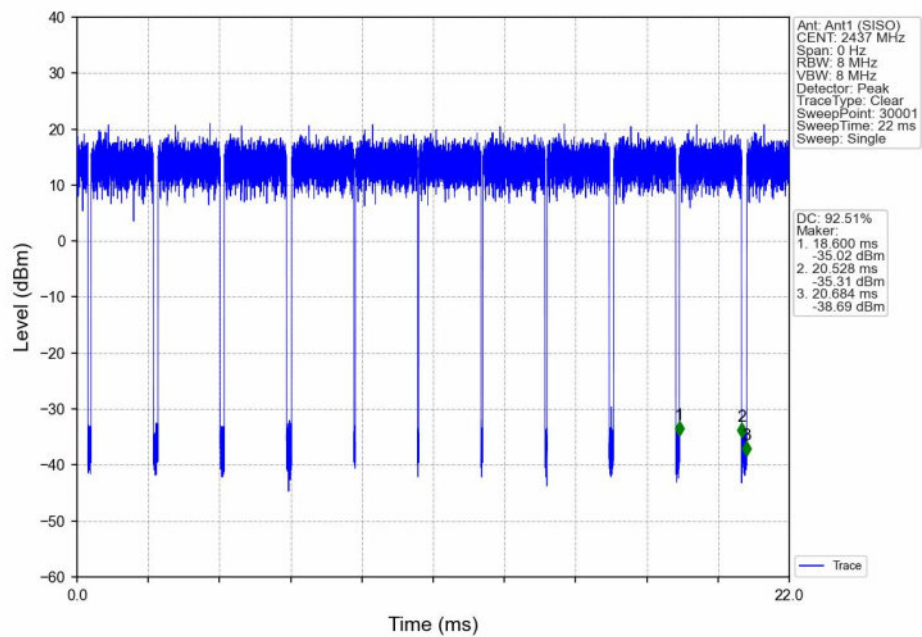




802.11n(HT20)_LCH_2412MHz_Ant1 (SISO)_NTNV

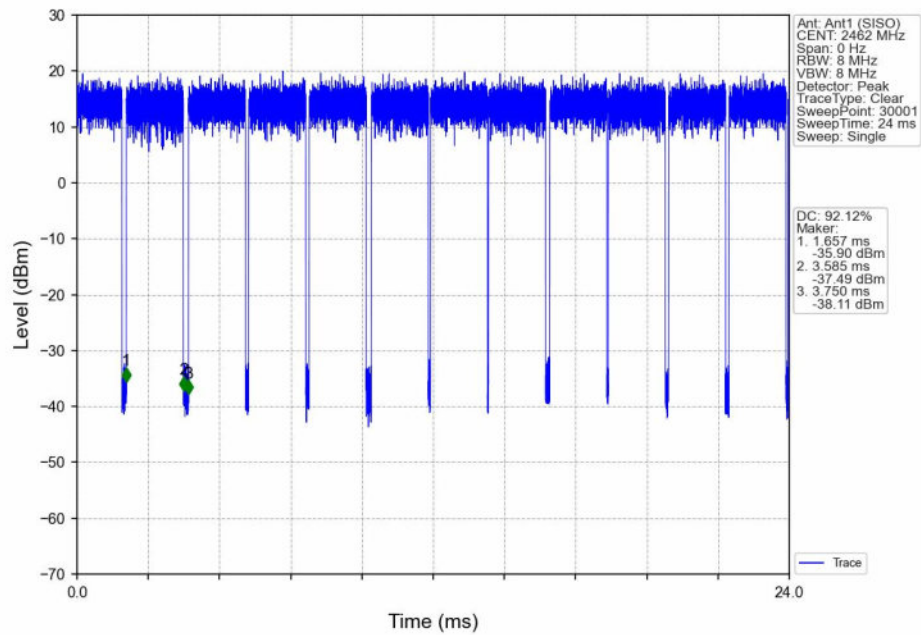


802.11n(HT20)_MCH_2437MHz_Ant1 (SISO)_NTNV

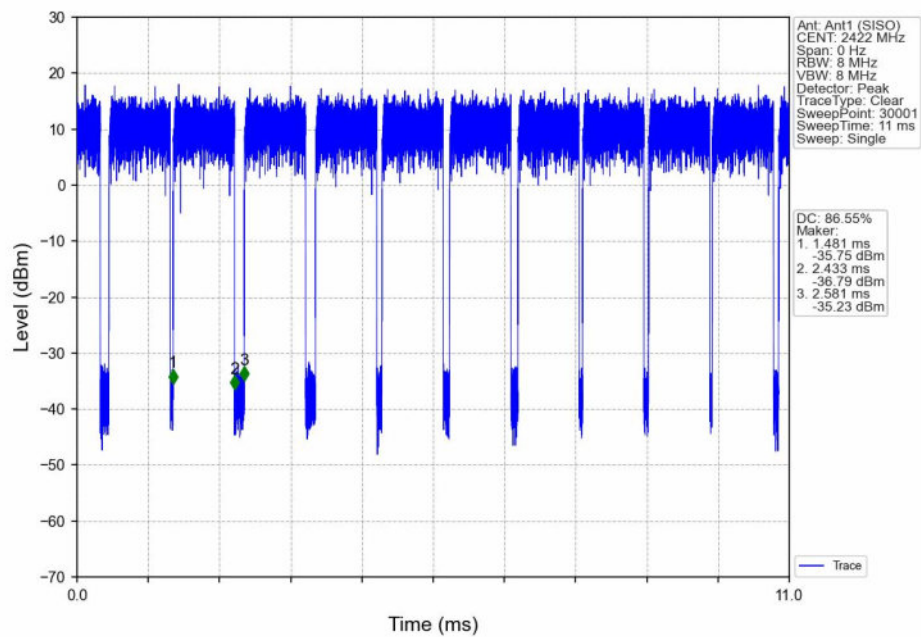




802.11n(HT20)_HCH_2462MHz_Ant1 (SISO)_NTNV

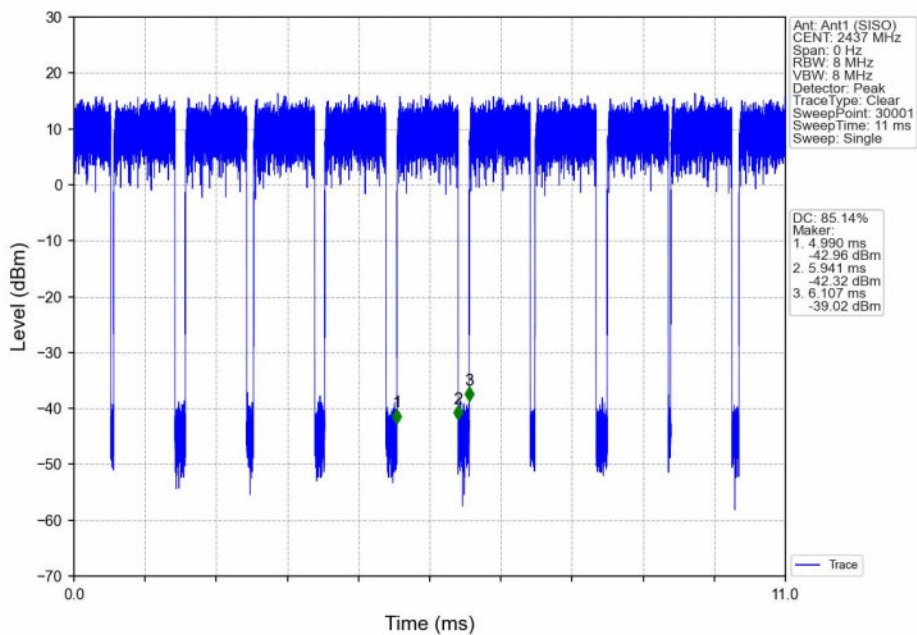


802.11n(HT40)_LCH_2422MHz_Ant1 (SISO)_NTNV

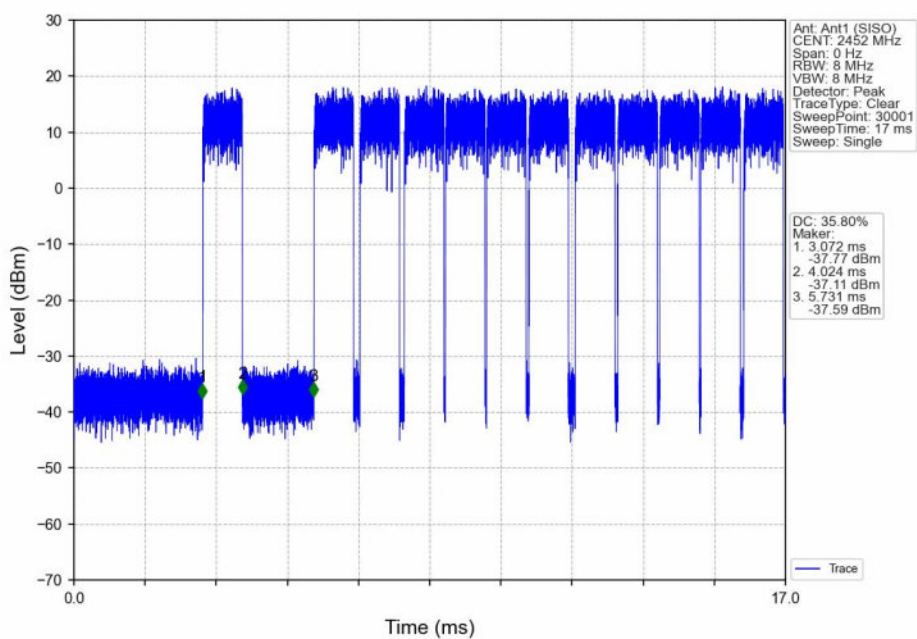




802.11n(HT40)_MCH_2437MHz_Ant1 (SISO)_NTNV



802.11n(HT40)_HCH_2452MHz_Ant1 (SISO)_NTNV





2. Bandwidth

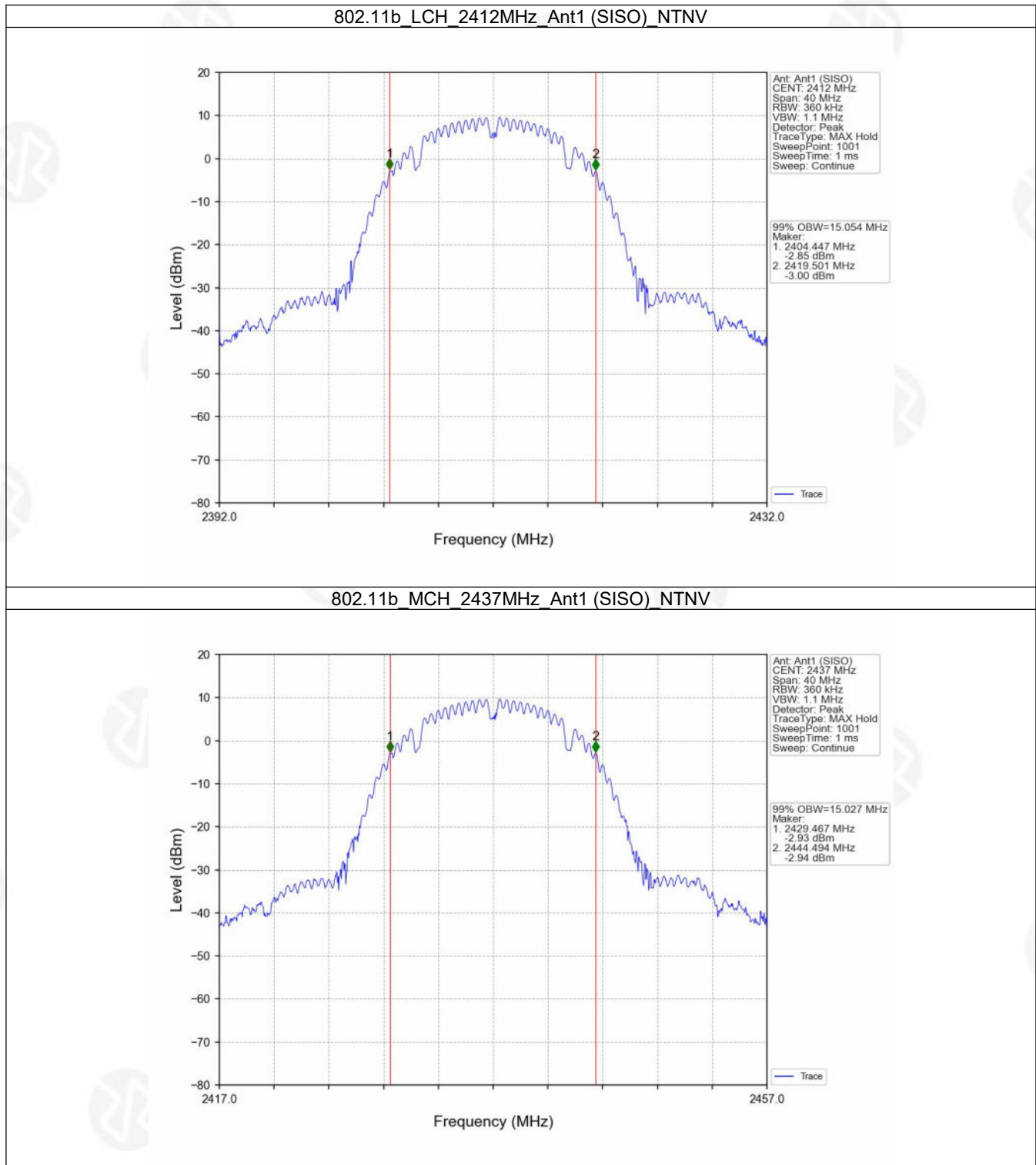
2.1 OBW

2.1.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	99% Occupied Bandwidth (MHz)		Verdict
				Result	Limit	
802.11b	SISO	2412	1	15.054	/	Pass
		2437	1	15.027	/	Pass
		2462	1	15.011	/	Pass
802.11g	SISO	2412	1	17.584	/	Pass
		2437	1	17.434	/	Pass
		2462	1	17.344	/	Pass
802.11n (HT20)	SISO	2412	1	18.195	/	Pass
		2437	1	18.361	/	Pass
		2462	1	18.288	/	Pass
802.11n (HT40)	SISO	2422	1	36.531	/	Pass
		2437	1	36.746	/	Pass
		2452	1	36.469	/	Pass

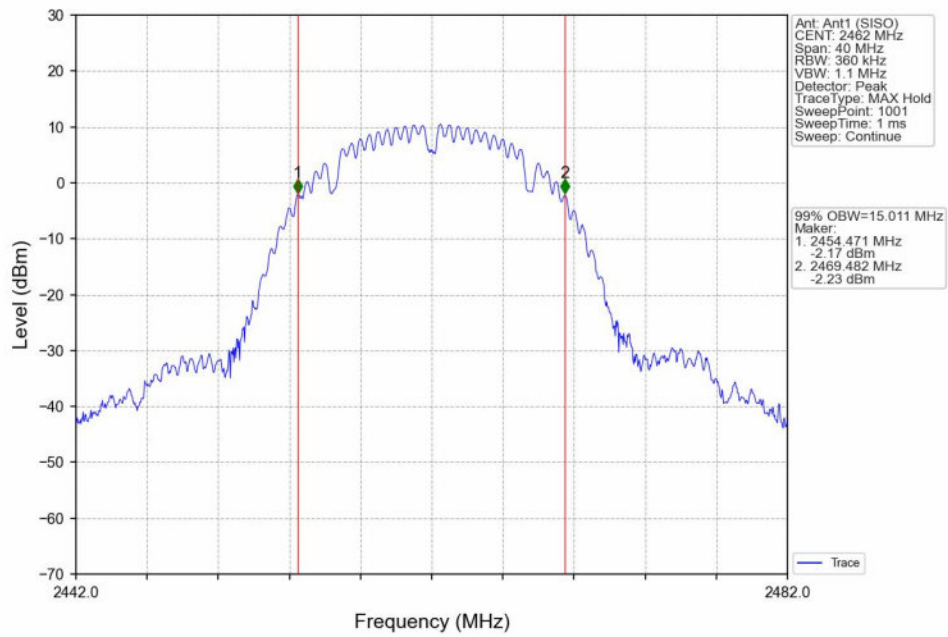


2.1.2 Test Graph

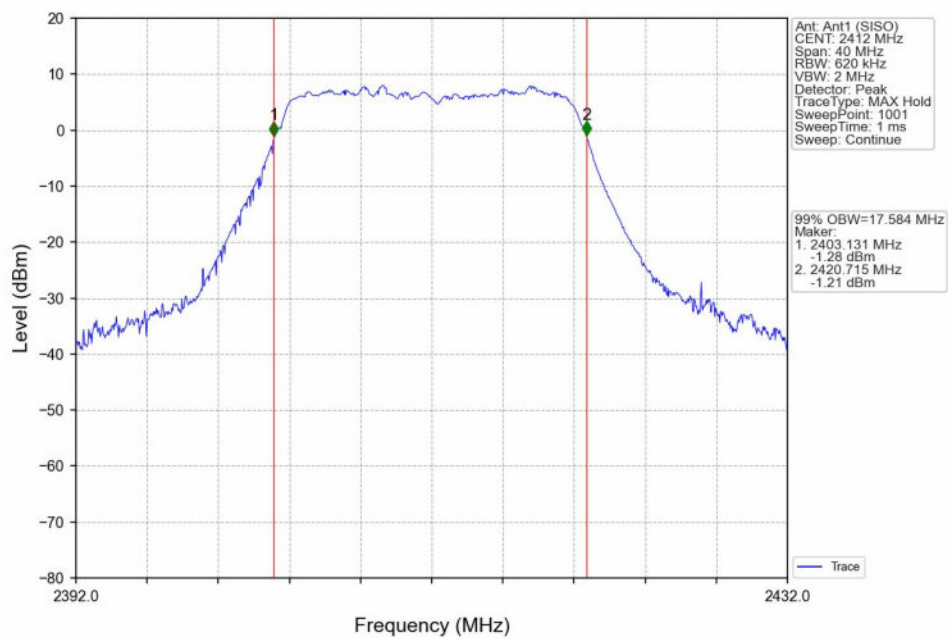




802.11b_HCH_2462MHz_Ant1 (SISO)_NTNV

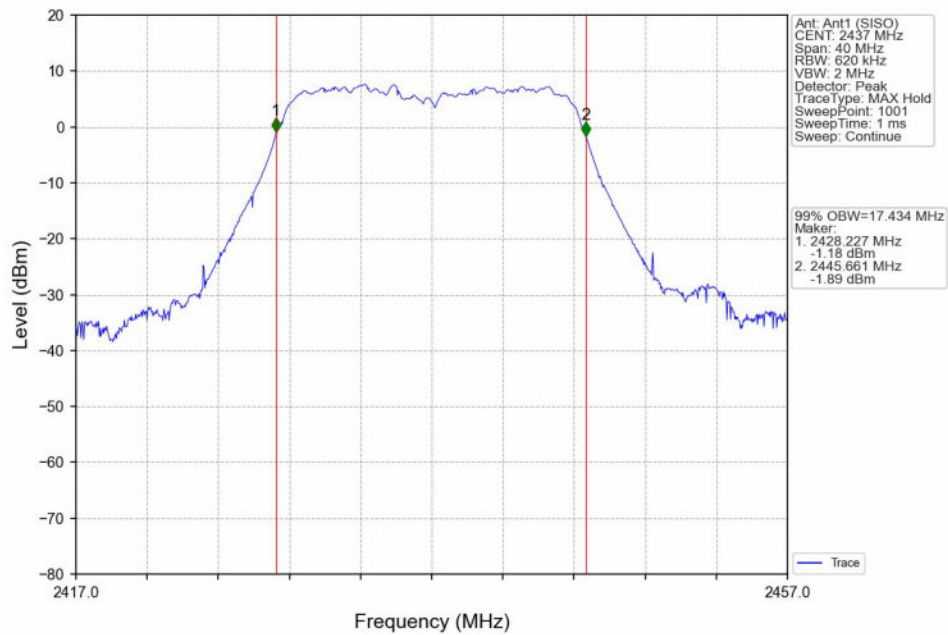


802.11g_LCH_2412MHz_Ant1 (SISO)_NTNV

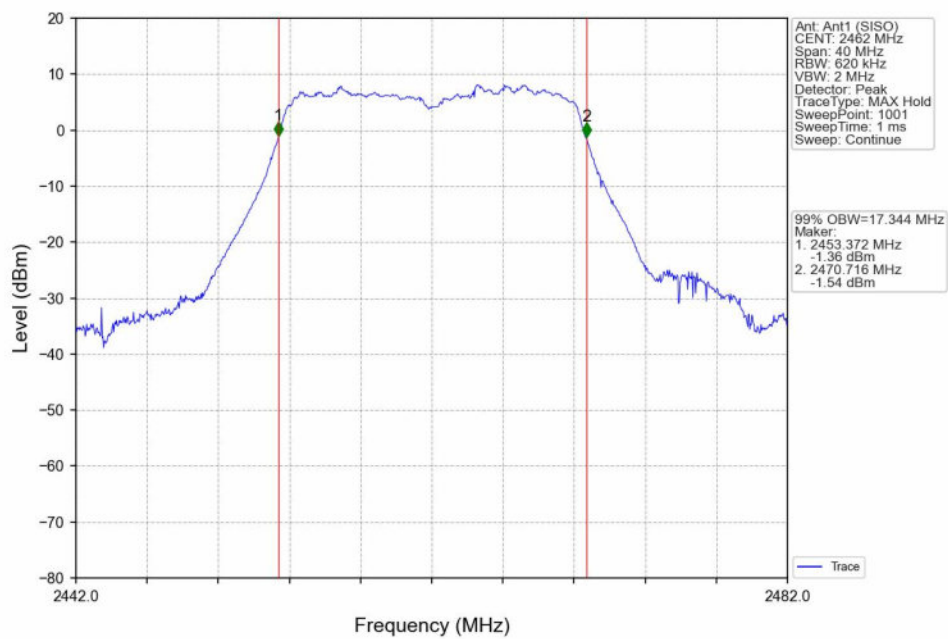




802.11g_MCH_2437MHz_Ant1 (SISO)_NTNV

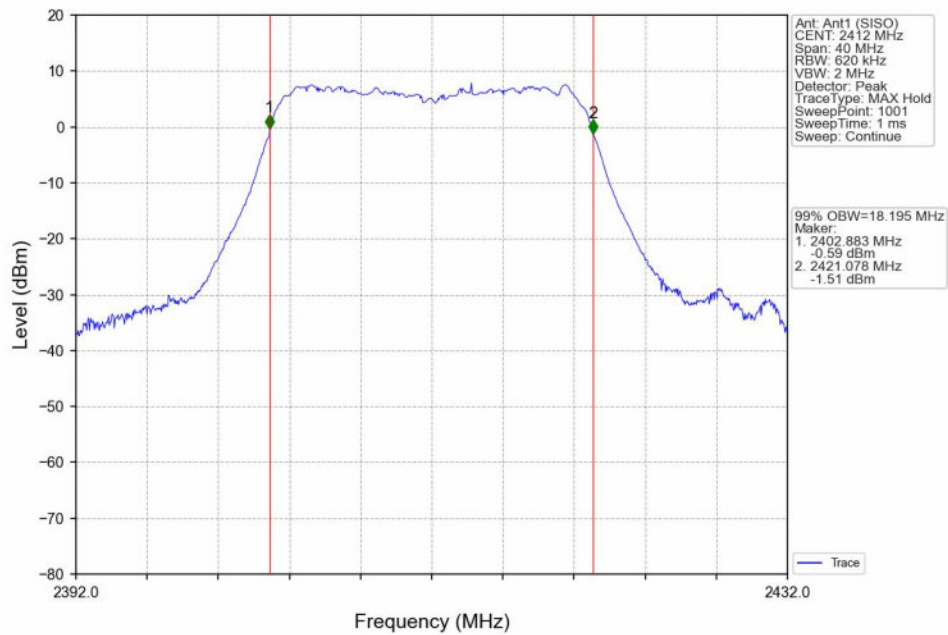


802.11g_HCH_2462MHz_Ant1 (SISO)_NTNV

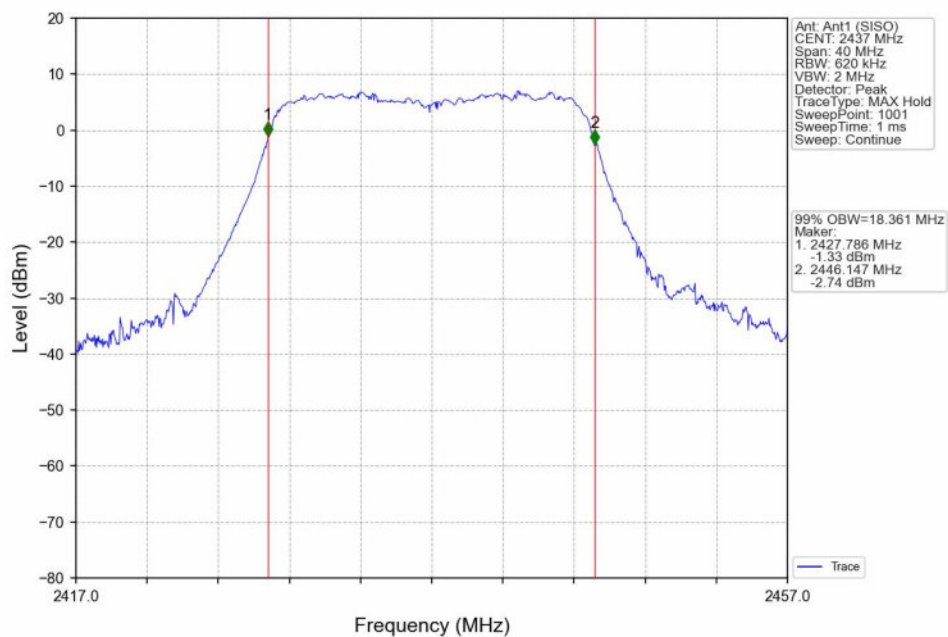




802.11n(HT20)_LCH_2412MHz_Ant1 (SISO)_NTNV

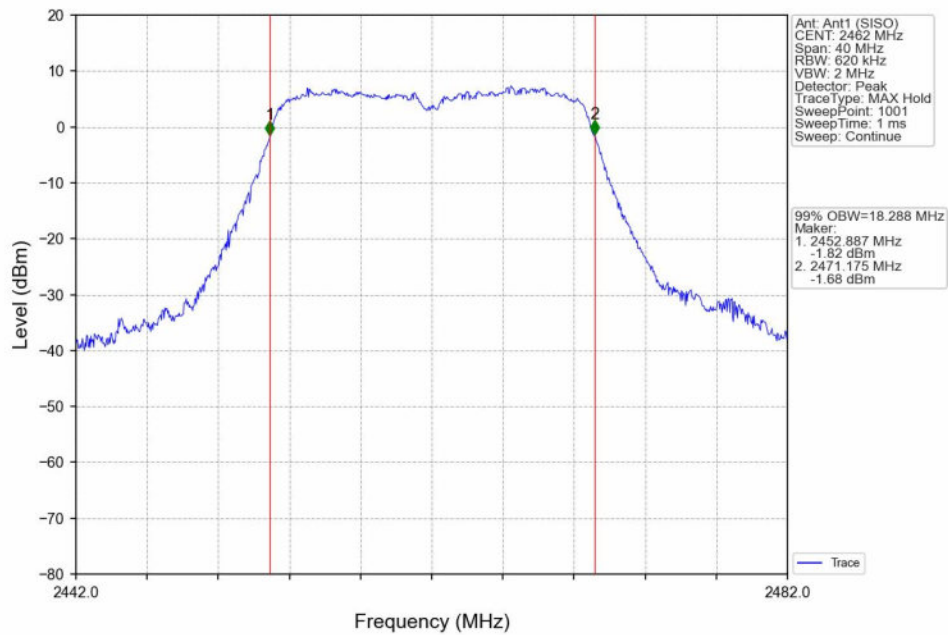


802.11n(HT20)_MCH_2437MHz_Ant1 (SISO)_NTNV

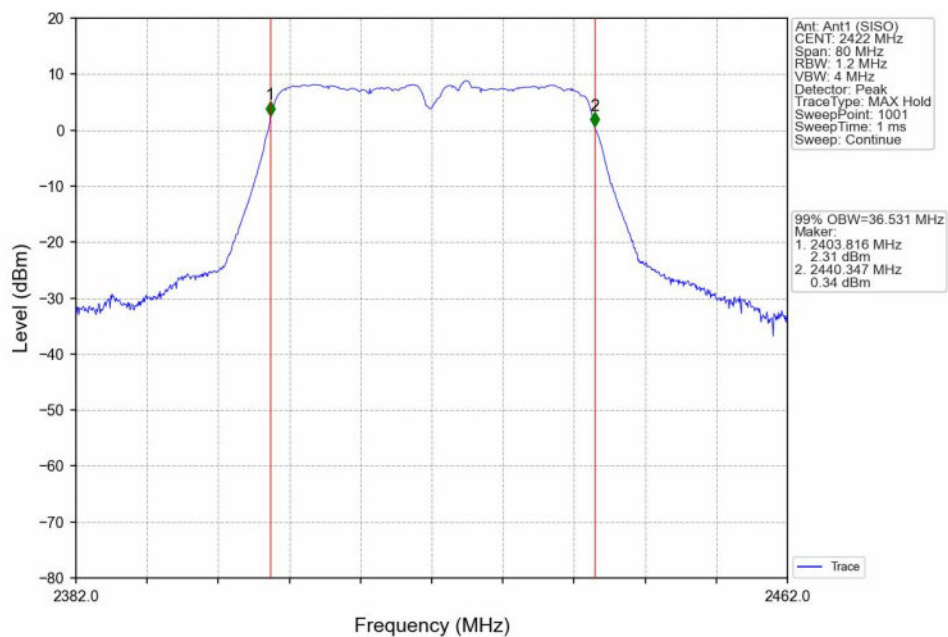




802.11n(HT20)_HCH_2462MHz_Ant1 (SISO)_NTNV

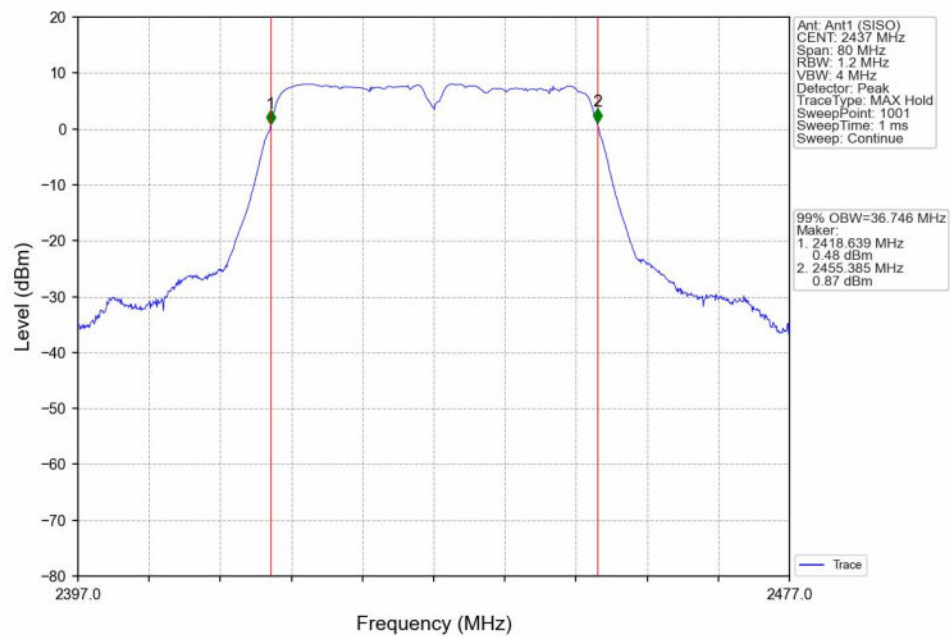


802.11n(HT40)_LCH_2422MHz_Ant1 (SISO)_NTNV

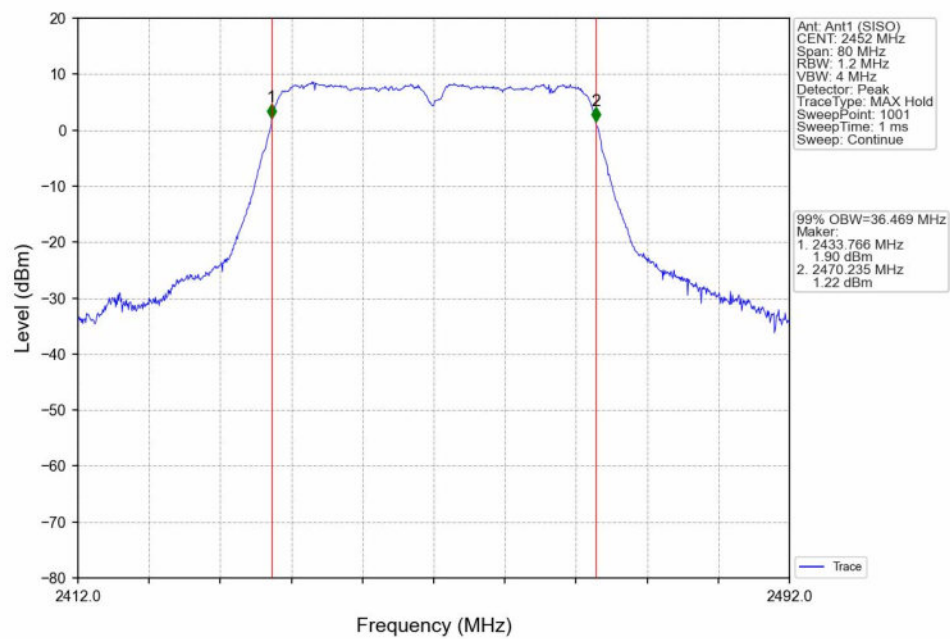




802.11n(HT40)_MCH_2437MHz_Ant1 (SISO)_NTNV



802.11n(HT40)_HCH_2452MHz_Ant1 (SISO)_NTNV





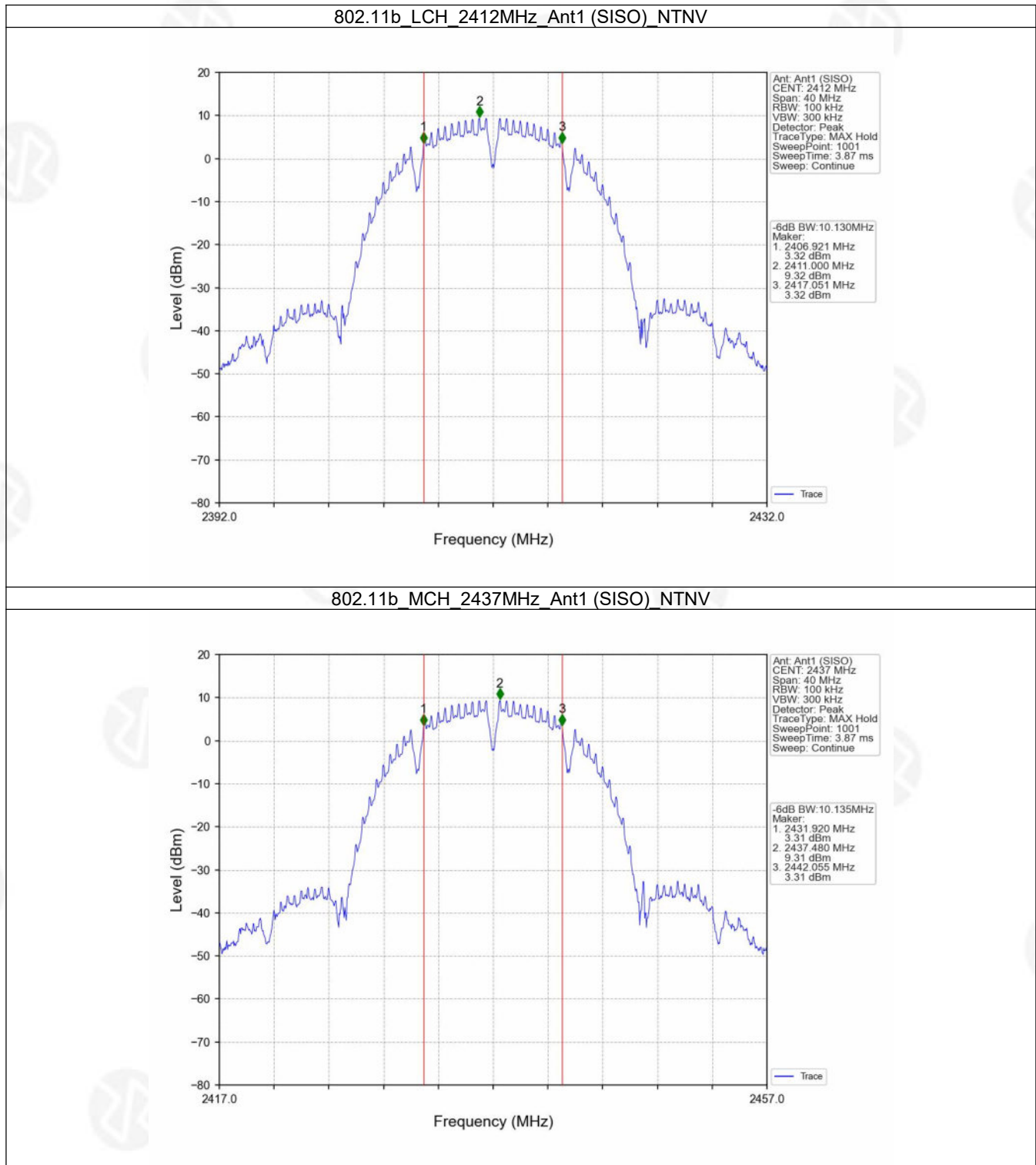
2.2 6dB BW

2.2.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
802.11b	SISO	2412	1	10.130	≥ 0.5	Pass
		2437	1	10.135	≥ 0.5	Pass
		2462	1	10.127	≥ 0.5	Pass
802.11g	SISO	2412	1	16.375	≥ 0.5	Pass
		2437	1	16.352	≥ 0.5	Pass
		2462	1	16.355	≥ 0.5	Pass
802.11n (HT20)	SISO	2412	1	17.041	≥ 0.5	Pass
		2437	1	17.075	≥ 0.5	Pass
		2462	1	17.088	≥ 0.5	Pass
802.11n (HT40)	SISO	2422	1	35.653	≥ 0.5	Pass
		2437	1	35.355	≥ 0.5	Pass
		2452	1	35.491	≥ 0.5	Pass

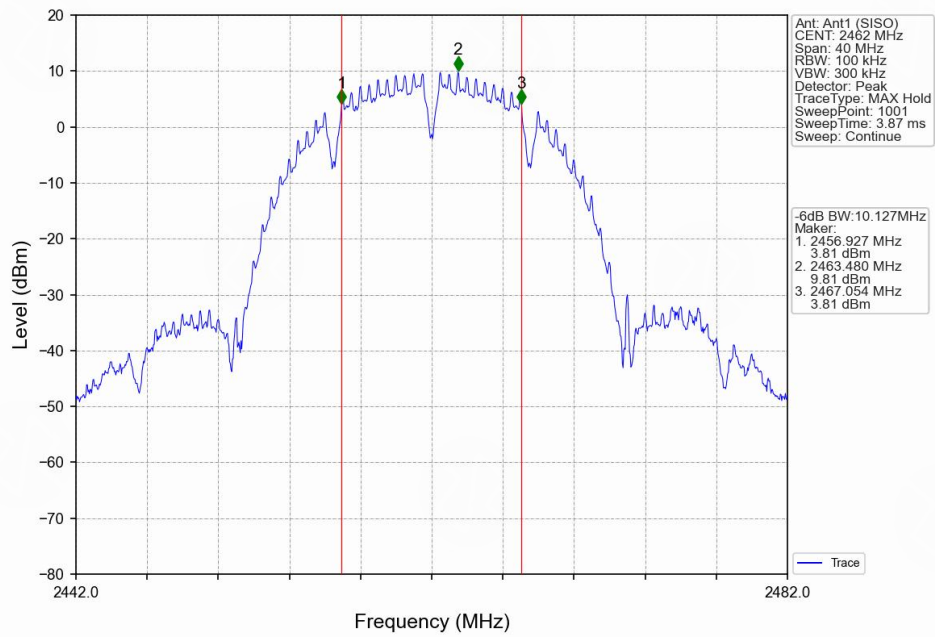


2.2.2 Test Graph

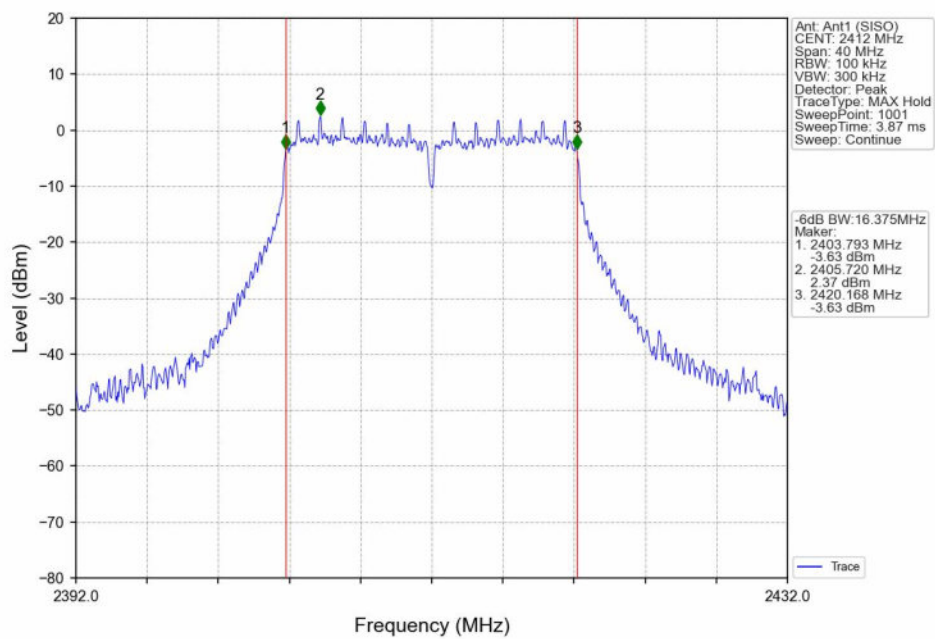




802.11b_HCH_2462MHz_Ant1 (SISO)_NTNV

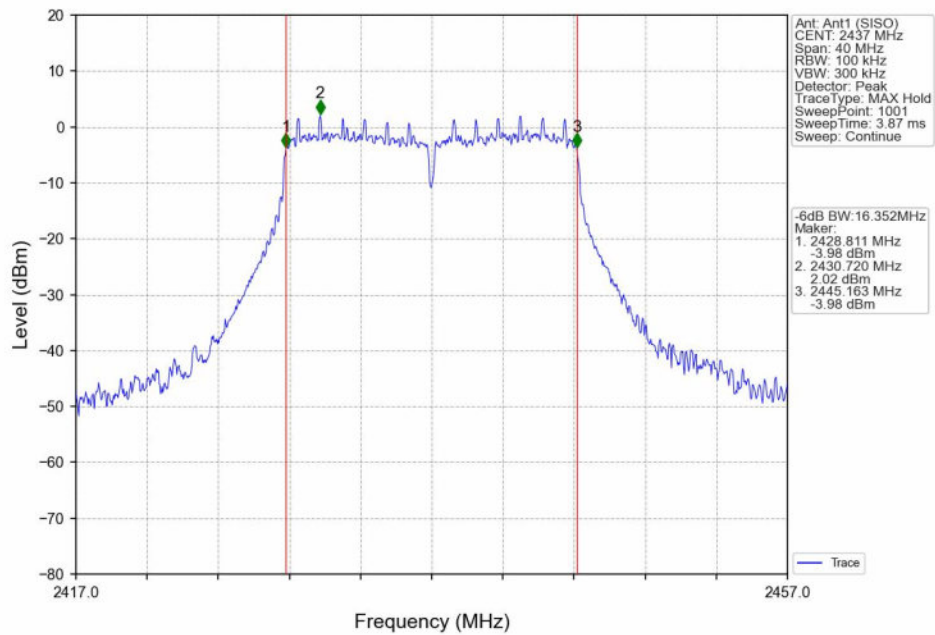


802.11g_LCH_2412MHz_Ant1 (SISO)_NTNV

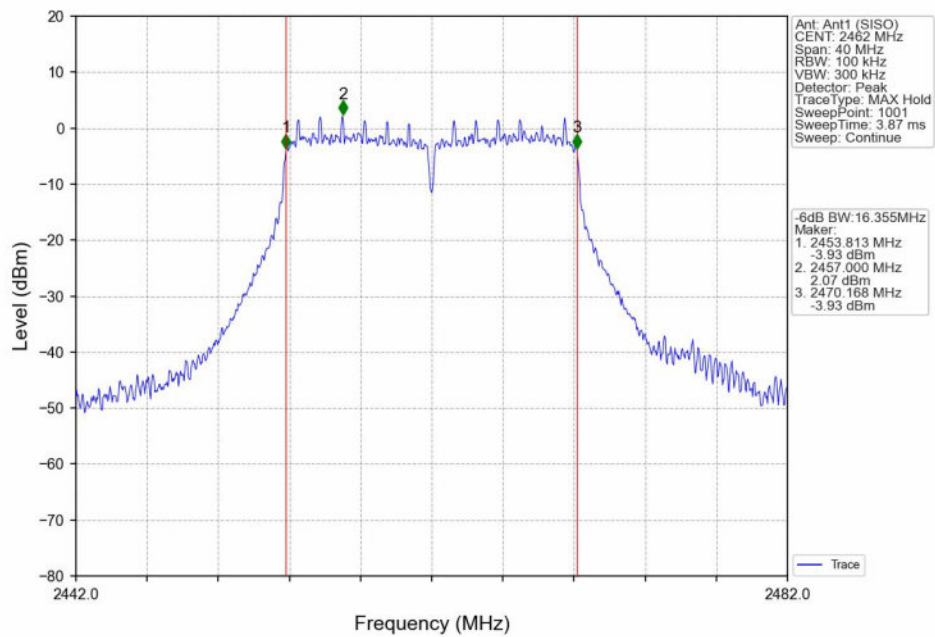




802.11g_MCH_2437MHz_Ant1 (SISO)_NTNV

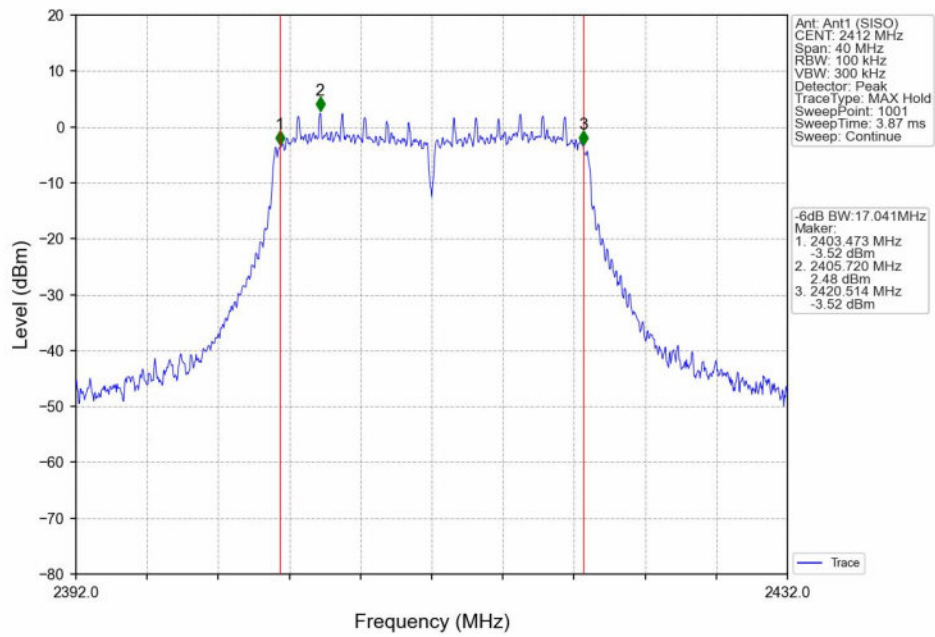


802.11g_HCH_2462MHz_Ant1 (SISO)_NTNV

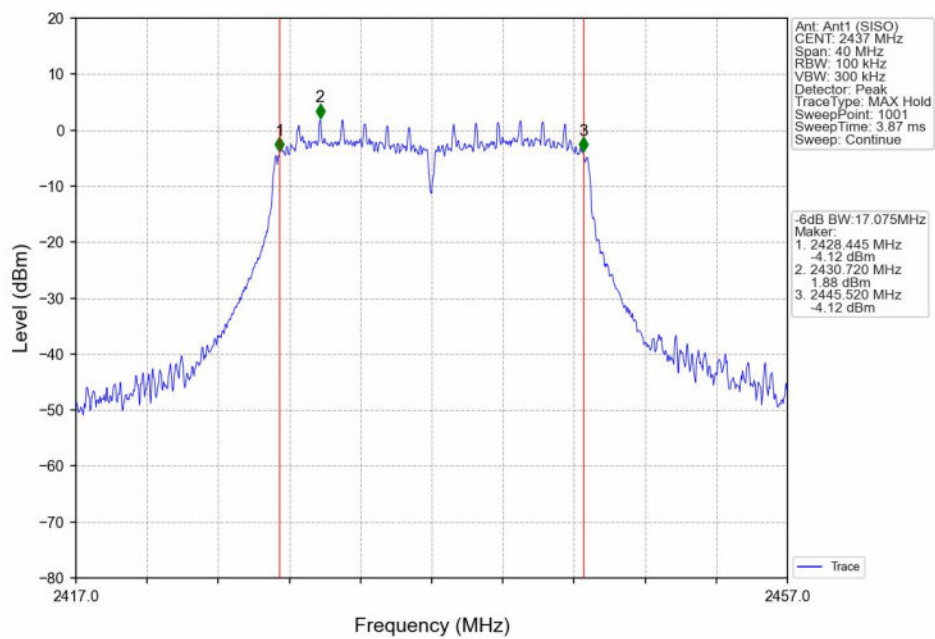




802.11n(HT20)_LCH_2412MHz_Ant1 (SISO)_NTNV

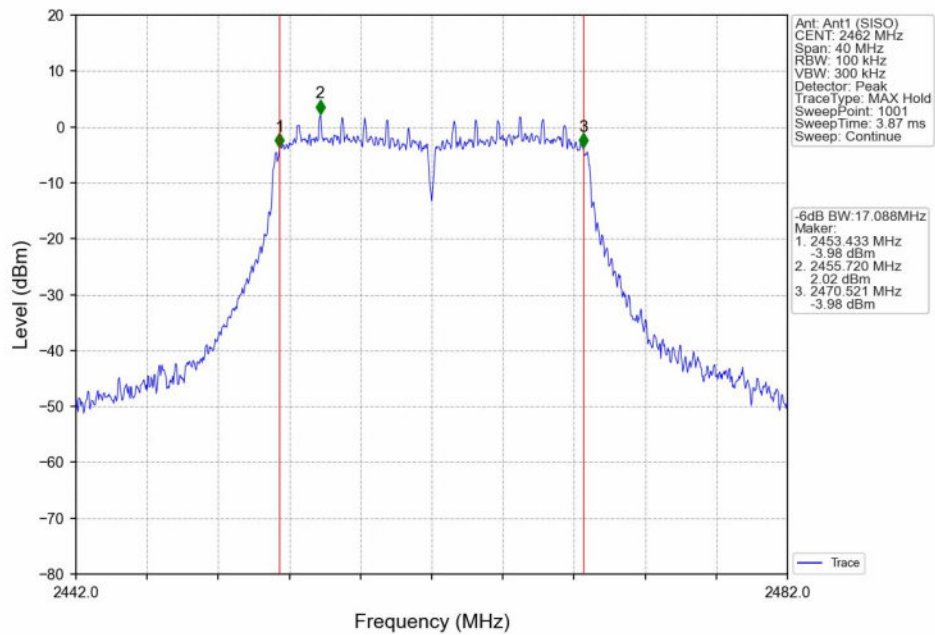


802.11n(HT20)_MCH_2437MHz_Ant1 (SISO)_NTNV

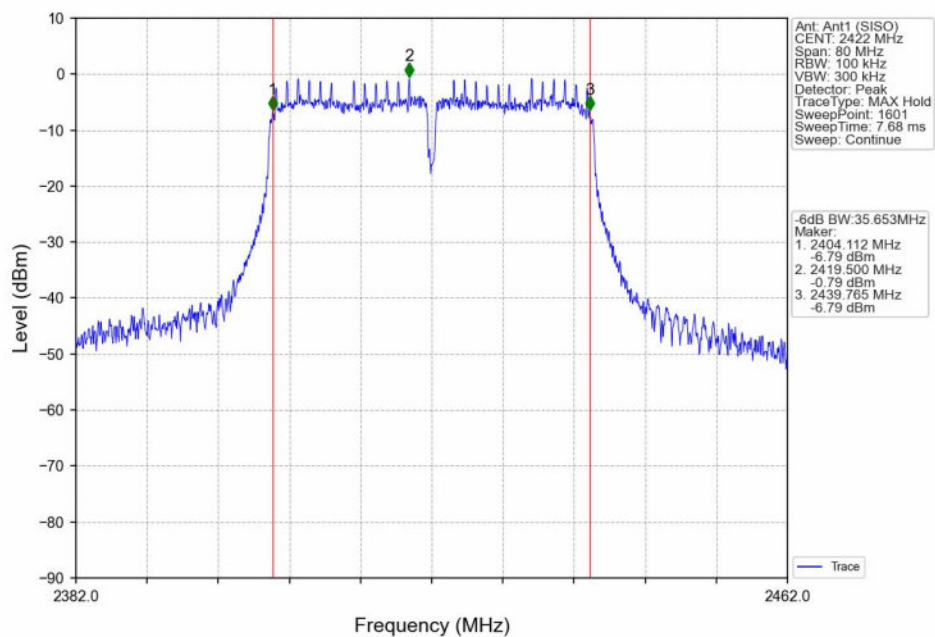




802.11n(HT20)_HCH_2462MHz_Ant1 (SISO)_NTNV

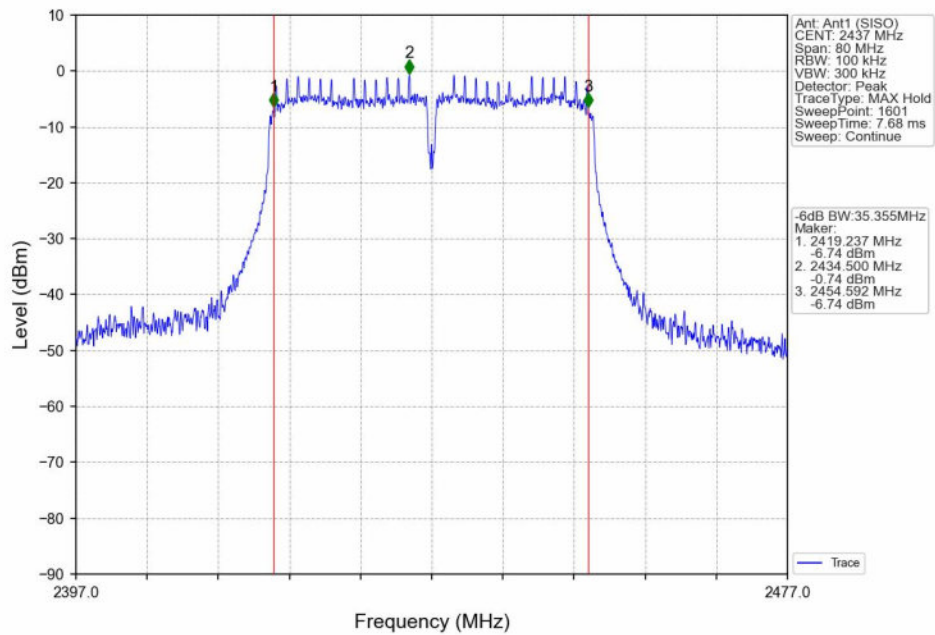


802.11n(HT40)_LCH_2422MHz_Ant1 (SISO)_NTNV

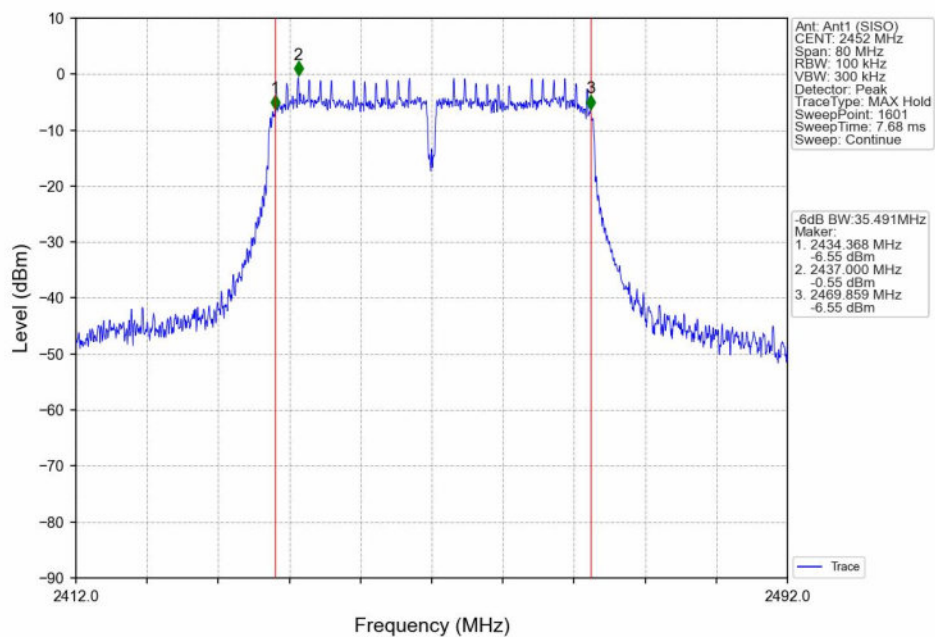




802.11n(HT40)_MCH_2437MHz_Ant1 (SISO)_NTNV



802.11n(HT40)_HCH_2452MHz_Ant1 (SISO)_NTNV





3. Maximum Conducted Output Power

3.1 Power

3.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)		Verdict
			ANT1	Limit	
802.11b	SISO	2412	21.07	<=30	Pass
		2437	21.14	<=30	Pass
		2462	21.82	<=30	Pass
802.11g	SISO	2412	20.97	<=30	Pass
		2437	20.62	<=30	Pass
		2462	20.71	<=30	Pass
802.11n (HT20)	SISO	2412	20.88	<=30	Pass
		2437	20.42	<=30	Pass
		2462	20.54	<=30	Pass
802.11n (HT40)	SISO	2422	21.16	<=30	Pass
		2437	20.99	<=30	Pass
		2452	21.35	<=30	Pass

Note1: Antenna Gain: Ant1: 1.10dBi;

EIRP

Mode	TX Type	Frequency (MHz)	E.I.R.P (dBm)		Verdict
			ANT1	Limit	
802.11b	SISO	2412	22.17	<=36.02	Pass
		2437	22.24	<=36.02	Pass
		2462	22.92	<=36.02	Pass
802.11g	SISO	2412	22.07	<=36.02	Pass
		2437	21.72	<=36.02	Pass
		2462	21.81	<=36.02	Pass
802.11n (HT20)	SISO	2412	21.98	<=36.02	Pass
		2437	21.52	<=36.02	Pass
		2462	21.64	<=36.02	Pass
802.11n (HT40)	SISO	2422	22.26	<=36.02	Pass
		2437	22.09	<=36.02	Pass
		2452	22.45	<=36.02	Pass

Note1: Antenna Gain: Ant1: 1.10dBi;
Note2: E.I.R.P = Measured Power + Antenna Gain



4. Maximum Power Spectral Density

4.1 PSD

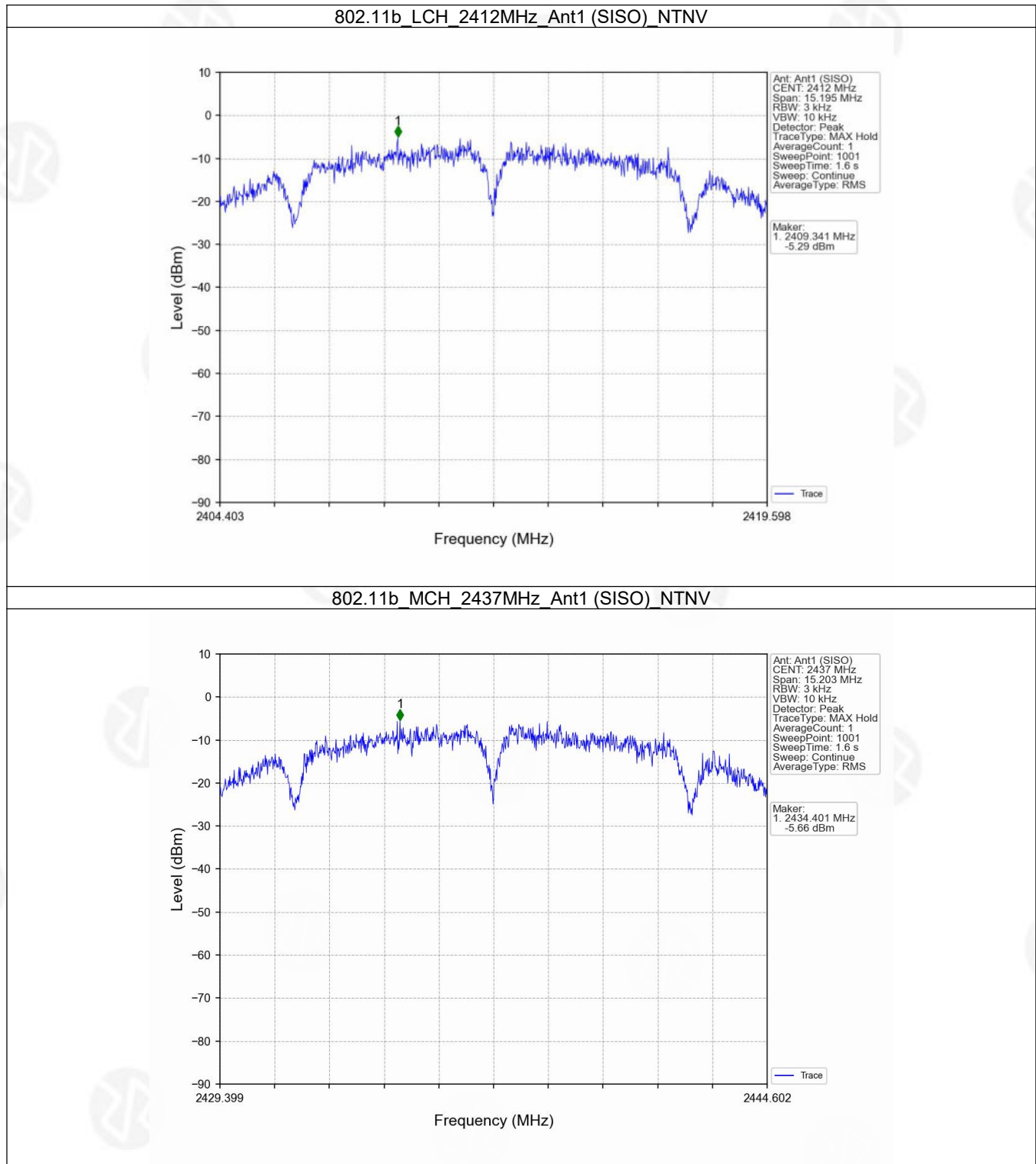
4.1.1 Test Result

Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm/3kHz)		Verdict
			ANT1	Limit	
802.11b	SISO	2412	-5.29	<=8	Pass
		2437	-5.66	<=8	Pass
		2462	-4.12	<=8	Pass
802.11g	SISO	2412	-11.01	<=8	Pass
		2437	-11.92	<=8	Pass
		2462	-12.26	<=8	Pass
802.11n (HT20)	SISO	2412	-12.73	<=8	Pass
		2437	-13.42	<=8	Pass
		2462	-12.21	<=8	Pass
802.11n (HT40)	SISO	2422	-15.17	<=8	Pass
		2437	-16.07	<=8	Pass
		2452	-14.46	<=8	Pass

Note1: Antenna Gain: Ant1: 1.10dBi;

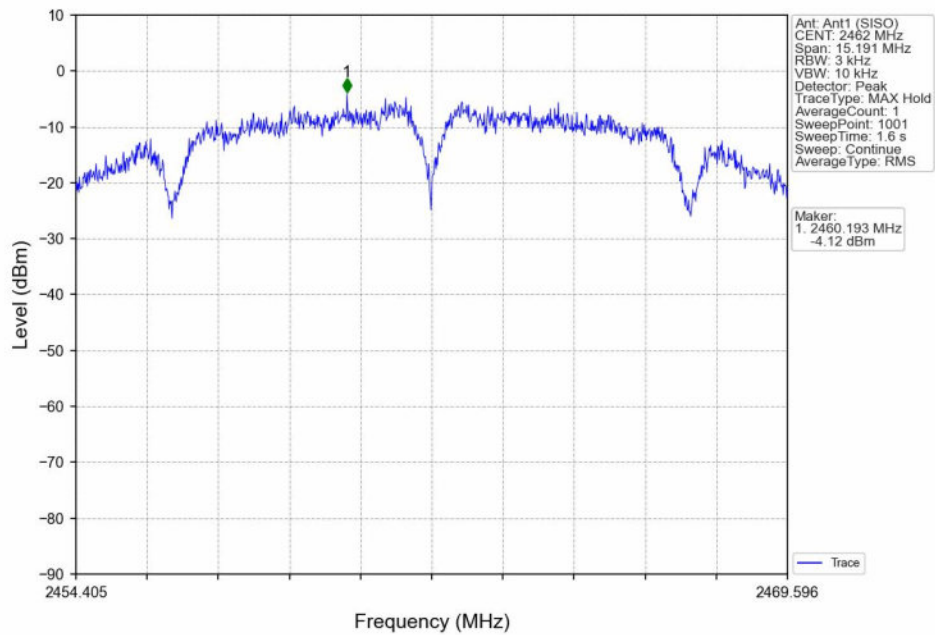


4.1.2 Test Graph

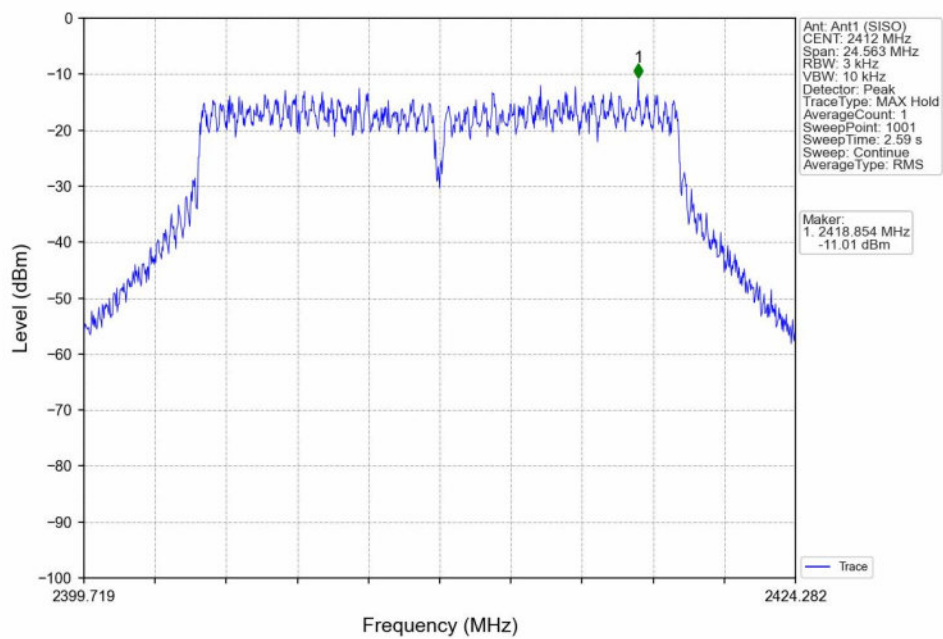




802.11b_HCH_2462MHz_Ant1 (SISO)_NTNV

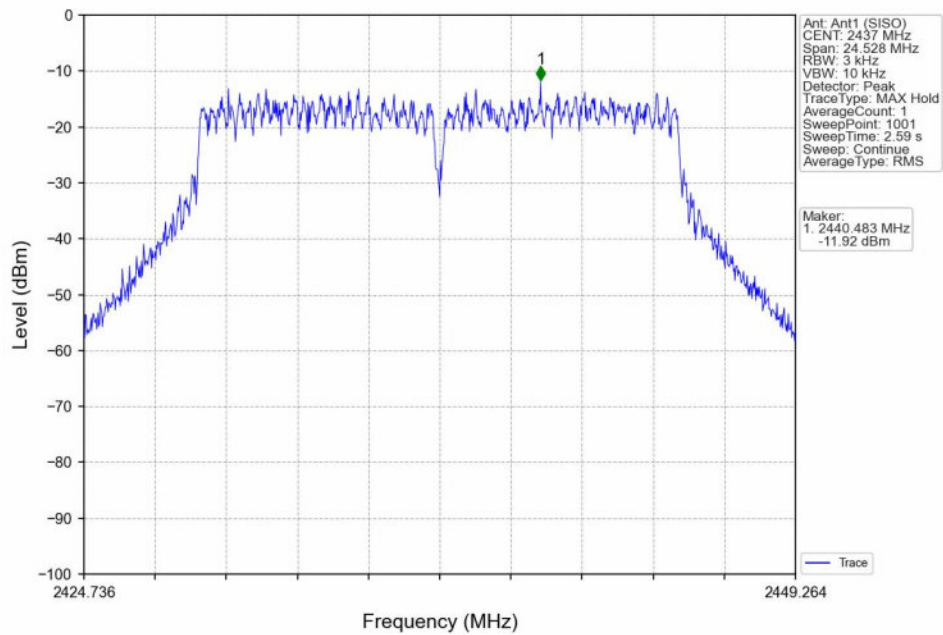


802.11g_LCH_2412MHz_Ant1 (SISO)_NTNV

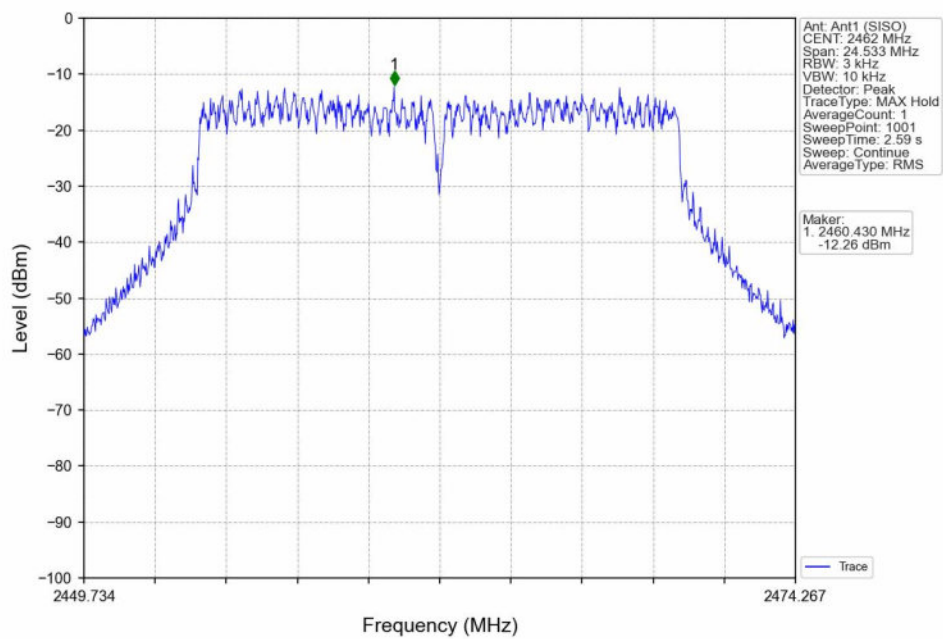




802.11g_MCH_2437MHz_Ant1 (SISO)_NTNV

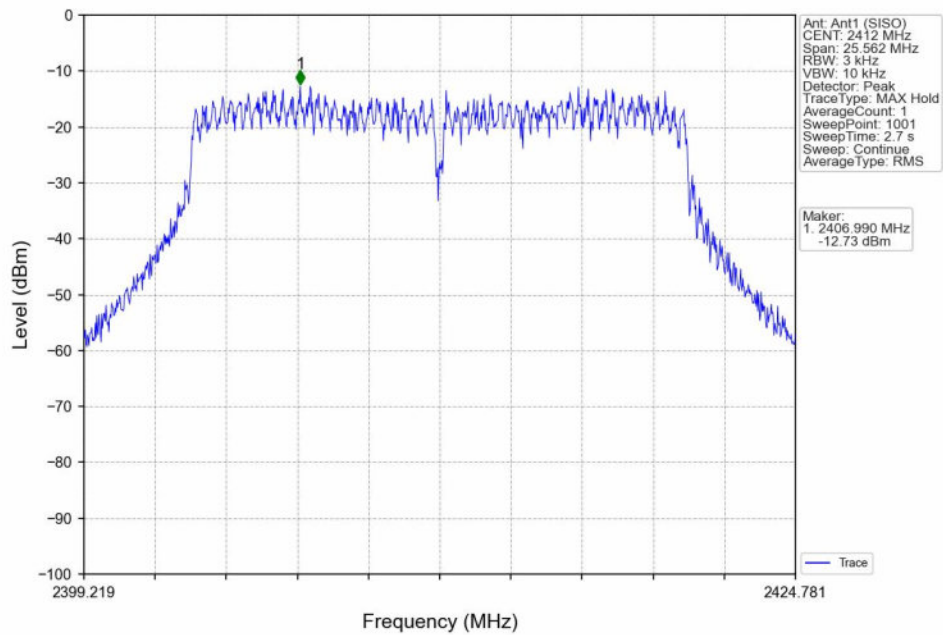


802.11g_HCH_2462MHz_Ant1 (SISO)_NTNV

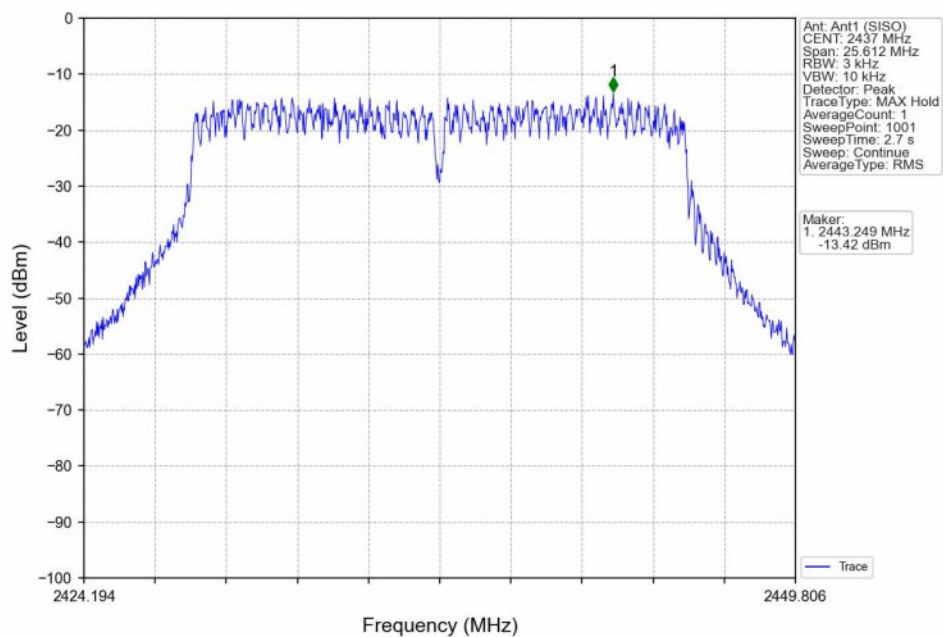




802.11n(HT20)_LCH_2412MHz_Ant1 (SISO)_NTNV

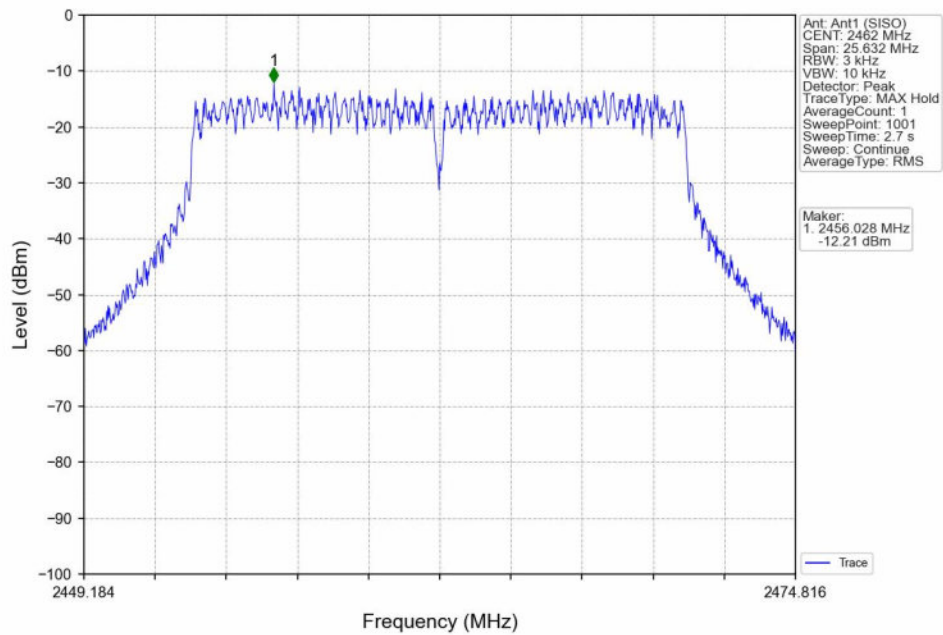


802.11n(HT20)_MCH_2437MHz_Ant1 (SISO)_NTNV

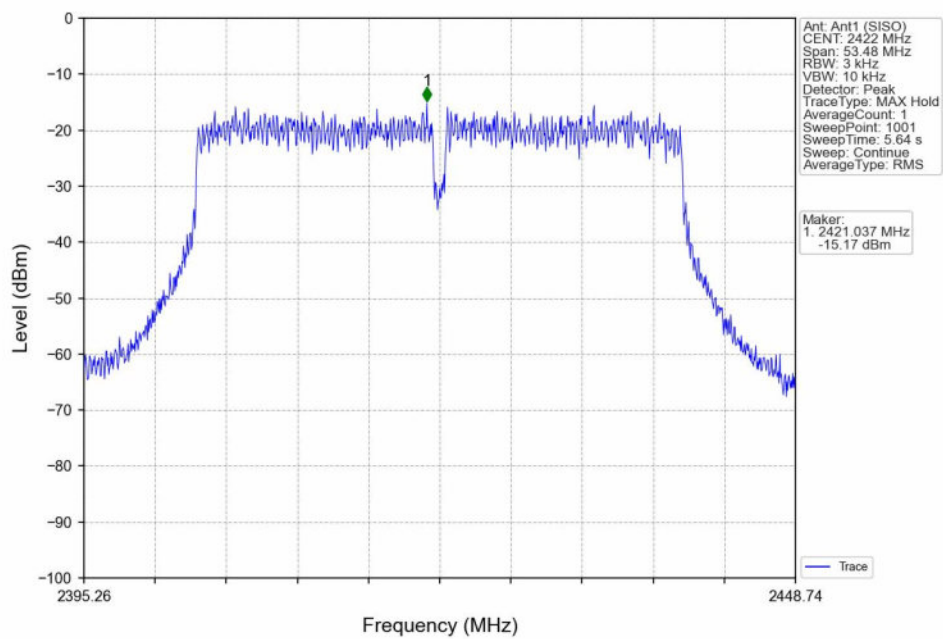




802.11n(HT20)_HCH_2462MHz_Ant1 (SISO)_NTNV

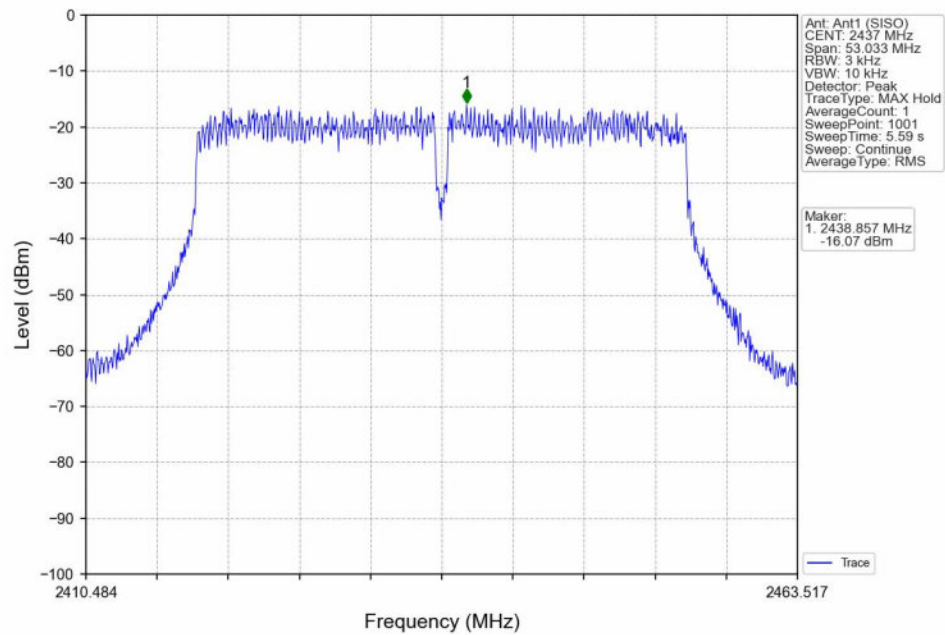


802.11n(HT40)_LCH_2422MHz_Ant1 (SISO)_NTNV

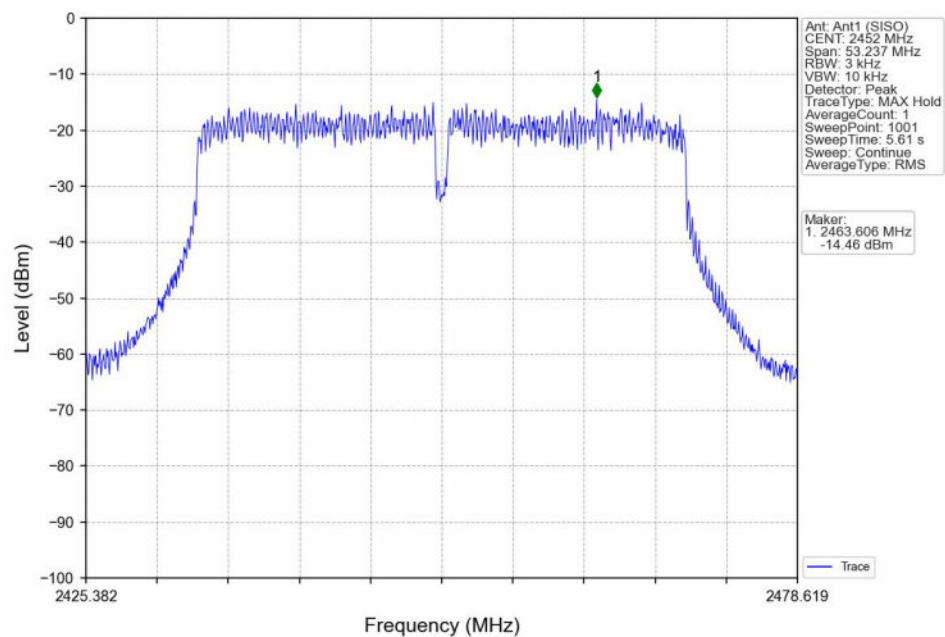




802.11n(HT40)_MCH_2437MHz_Ant1 (SISO)_NTNV



802.11n(HT40)_HCH_2452MHz_Ant1 (SISO)_NTNV





5. Unwanted Emissions In Non-restricted Frequency Bands

5.1 Ref

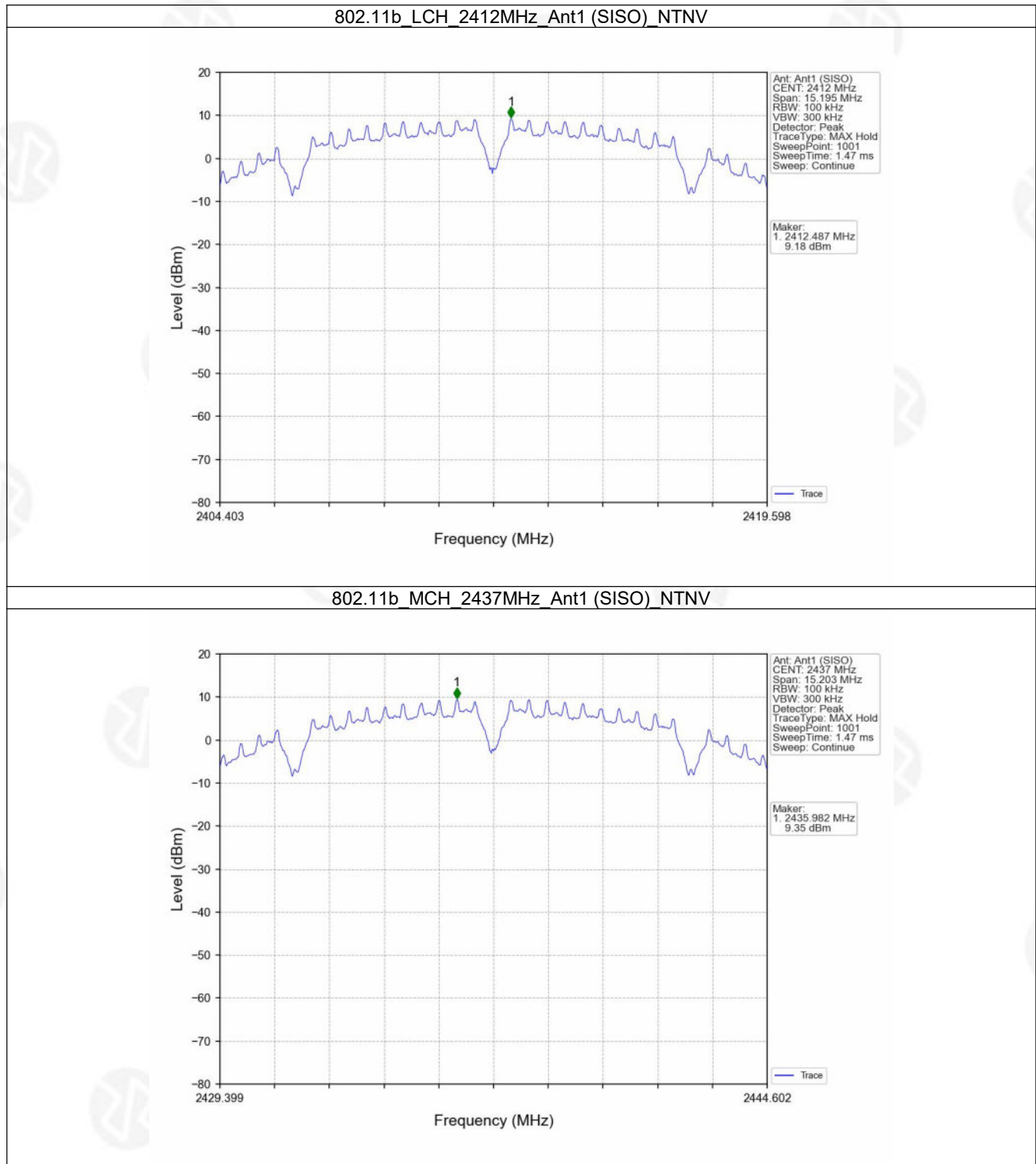
5.1.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
802.11b	SISO	2412	1	9.18
		2437	1	9.35
		2462	1	9.63
802.11g	SISO	2412	1	2.33
		2437	1	2.03
		2462	1	1.90
802.11n (HT20)	SISO	2412	1	2.31
		2437	1	1.90
		2462	1	2.03
802.11n (HT40)	SISO	2422	1	-0.76
		2437	1	-0.78
		2452	1	-0.58

Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.

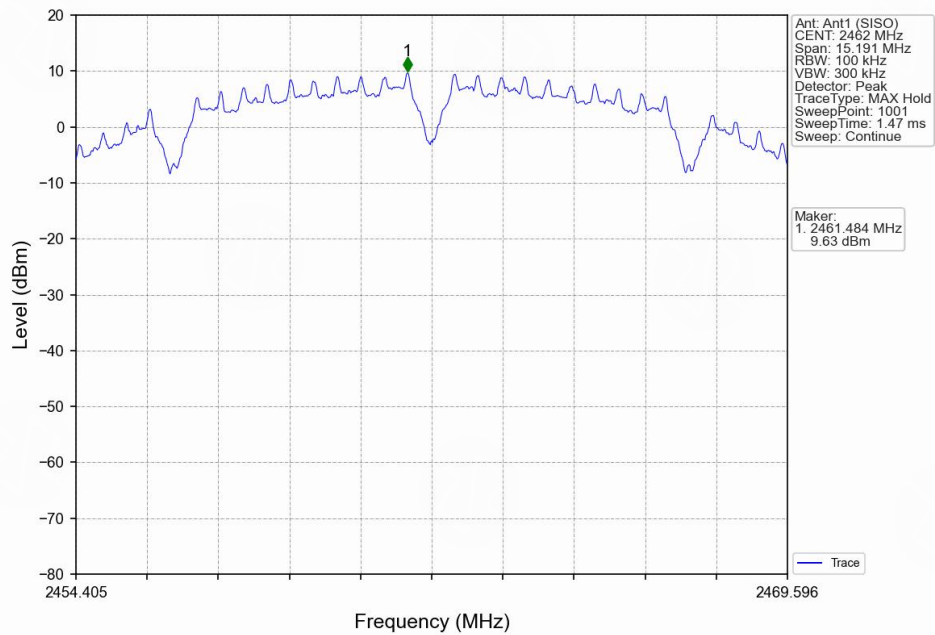


5.1.2 Test Graph

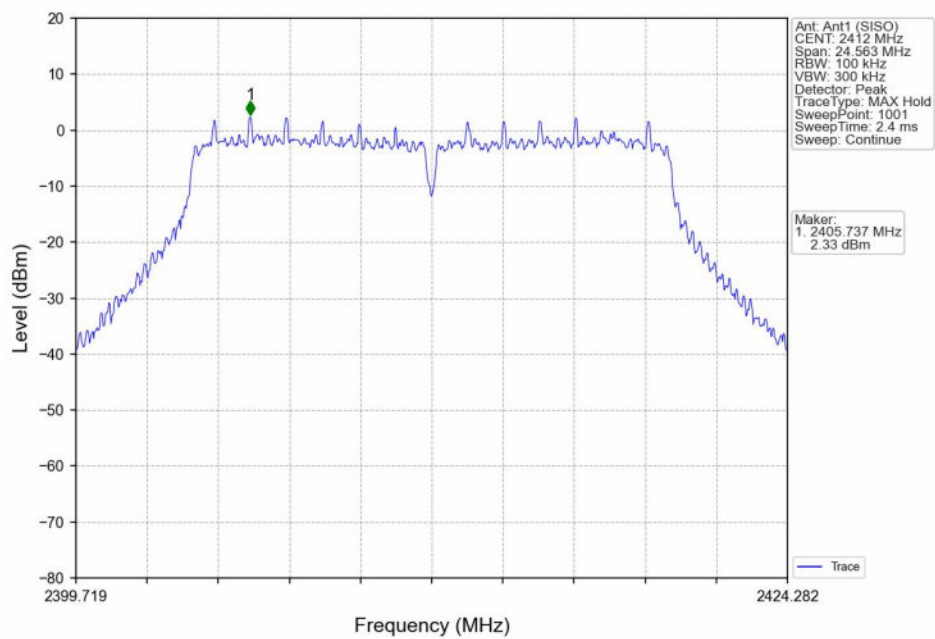




802.11b_HCH_2462MHz_Ant1 (SISO)_NTNV

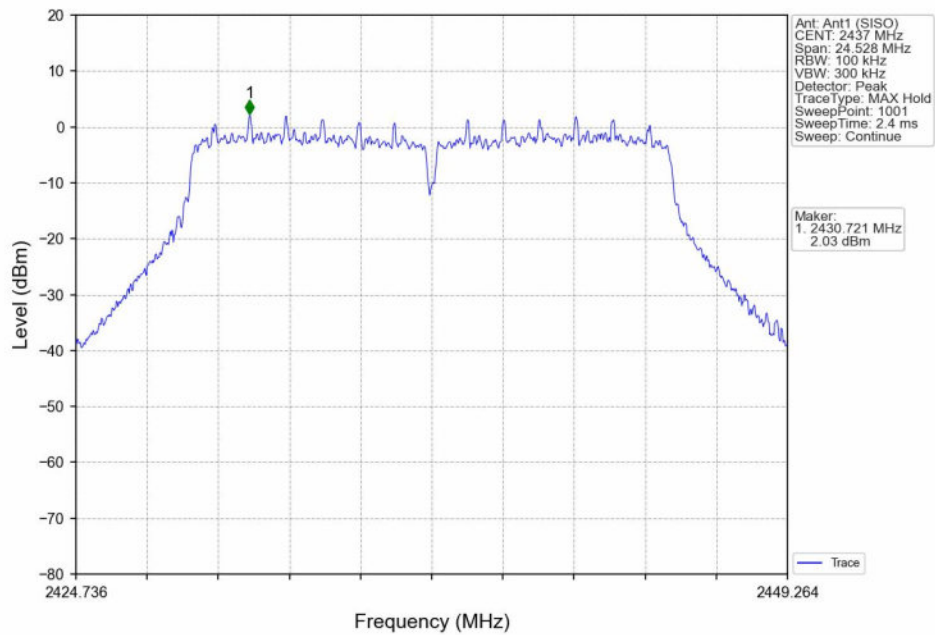


802.11g_LCH_2412MHz_Ant1 (SISO)_NTNV

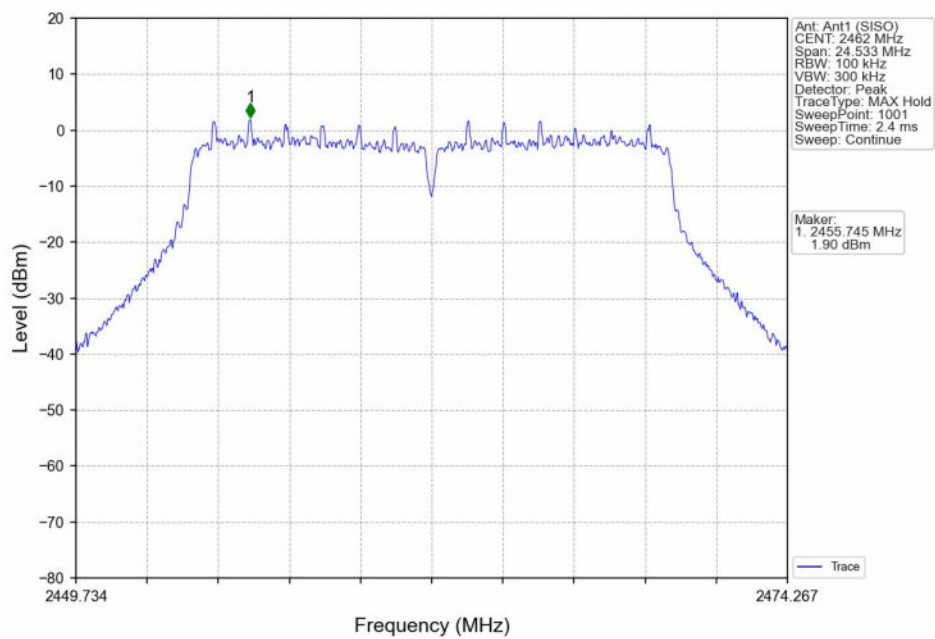




802.11g_MCH_2437MHz_Ant1 (SISO)_NTNV

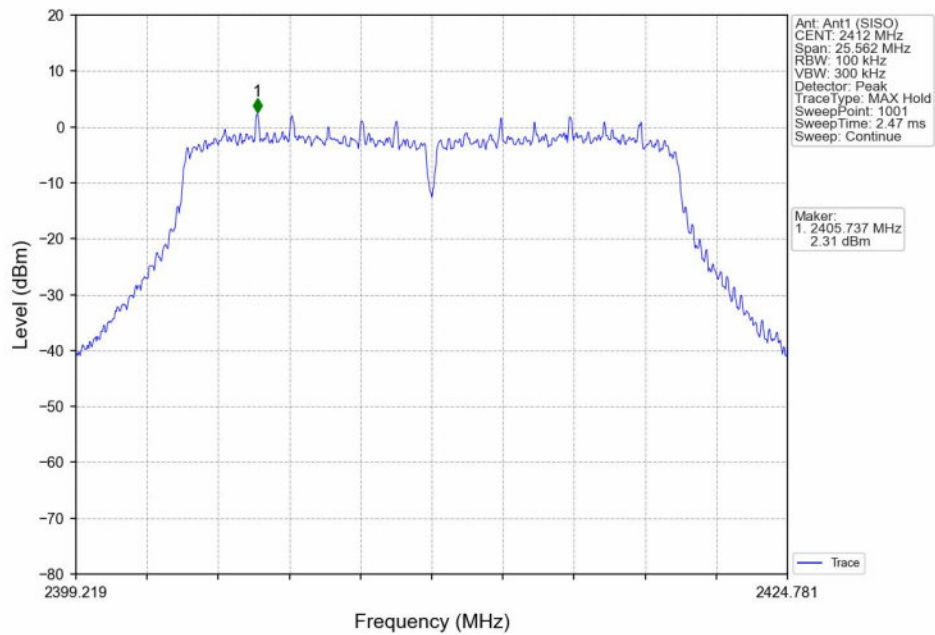


802.11g_HCH_2462MHz_Ant1 (SISO)_NTNV

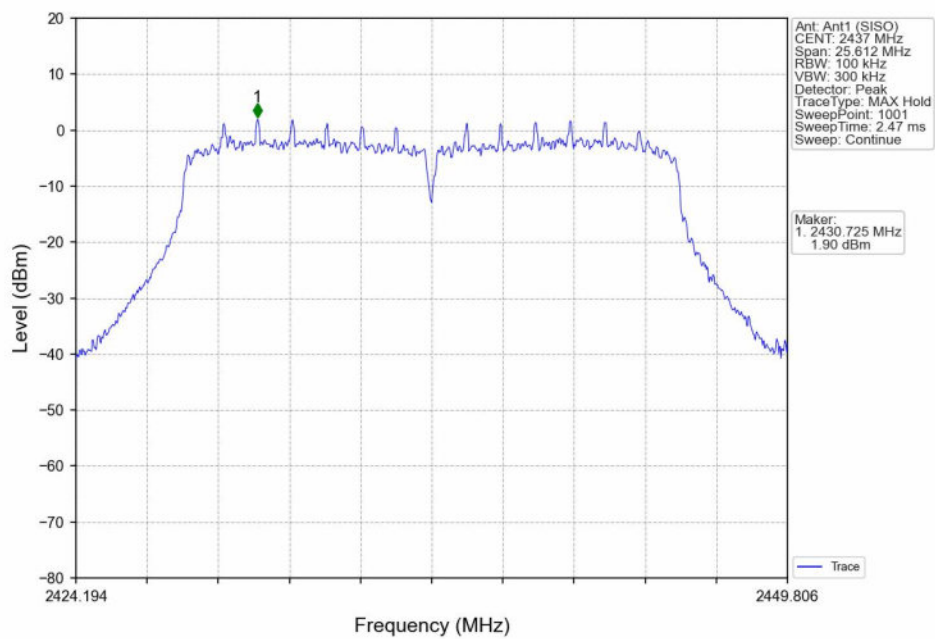




802.11n(HT20)_LCH_2412MHz_Ant1 (SISO)_NTNV

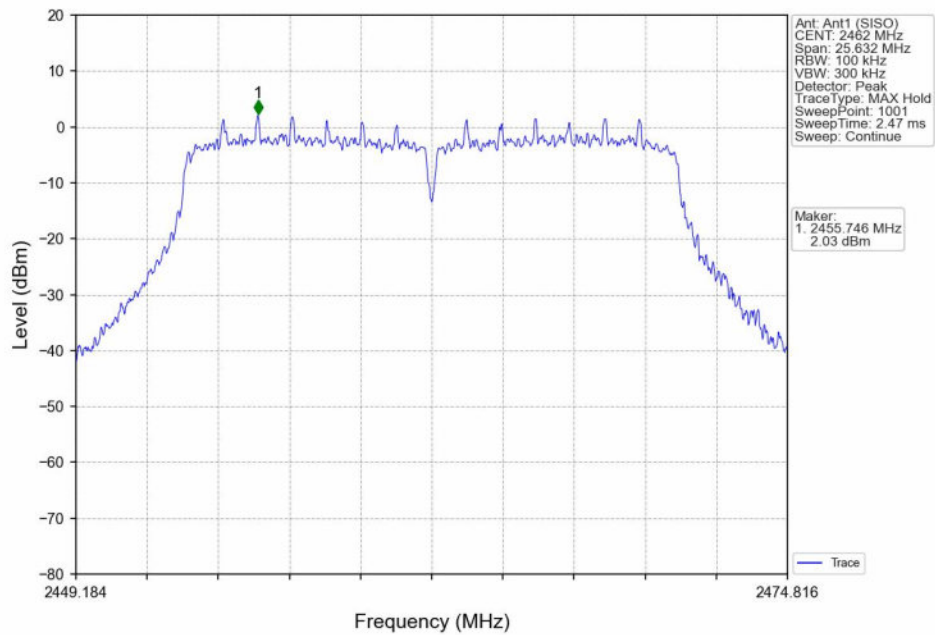


802.11n(HT20)_MCH_2437MHz_Ant1 (SISO)_NTNV

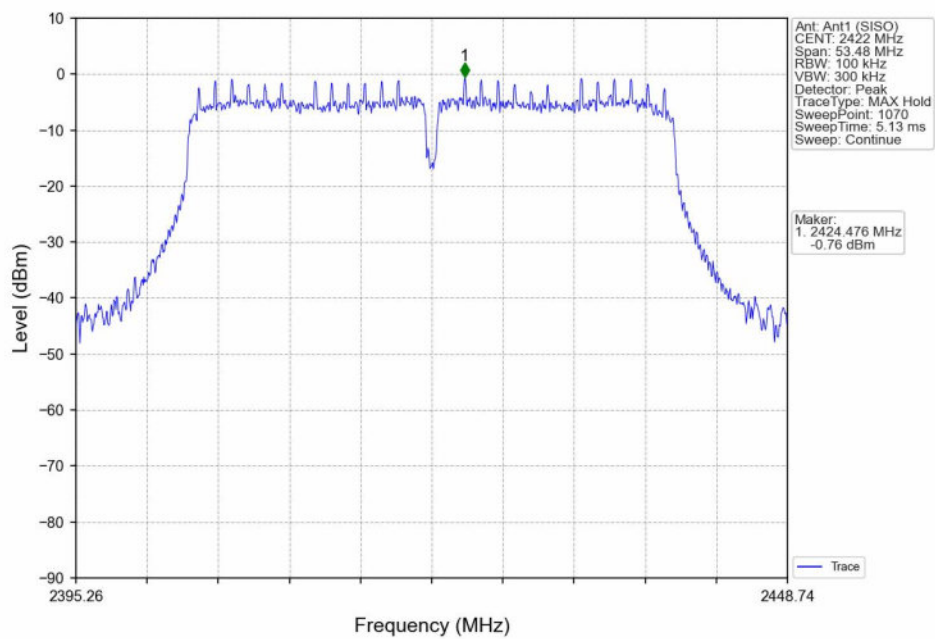




802.11n(HT20)_HCH_2462MHz_Ant1 (SISO)_NTNV

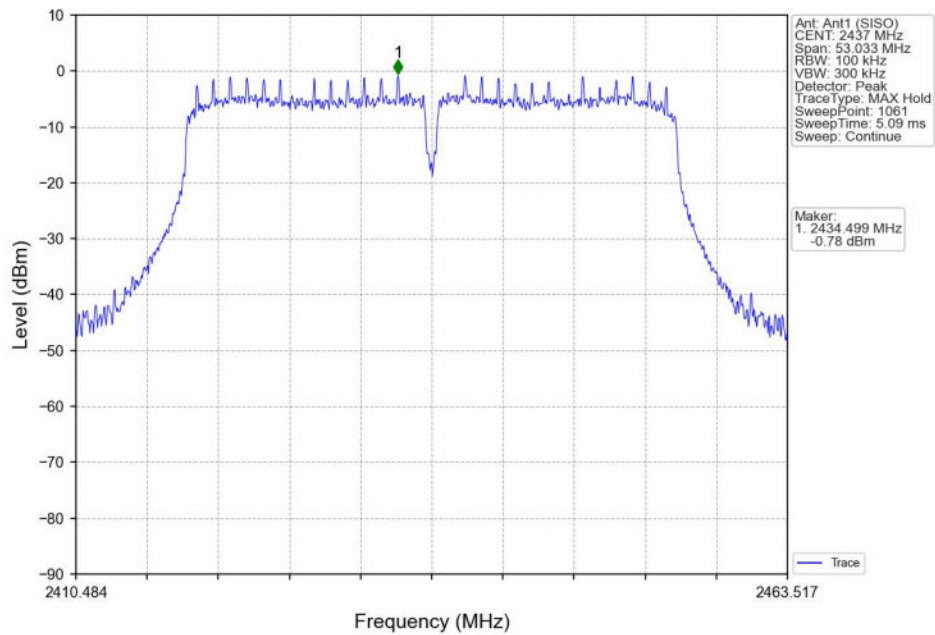


802.11n(HT40)_LCH_2422MHz_Ant1 (SISO)_NTNV

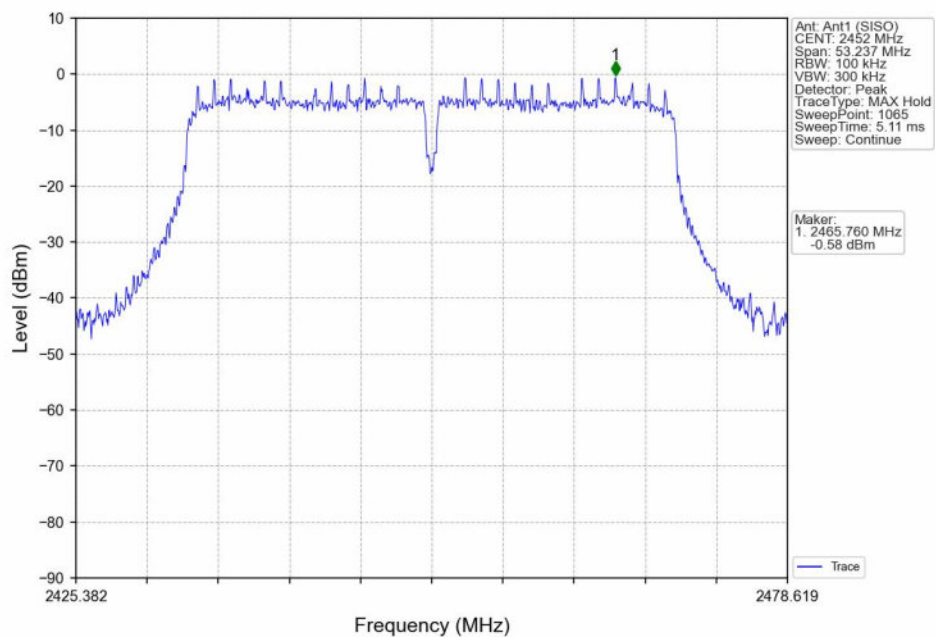




802.11n(HT40)_MCH_2437MHz_Ant1 (SISO)_NTNV



802.11n(HT40)_HCH_2452MHz_Ant1 (SISO)_NTNV





5.2 CSE

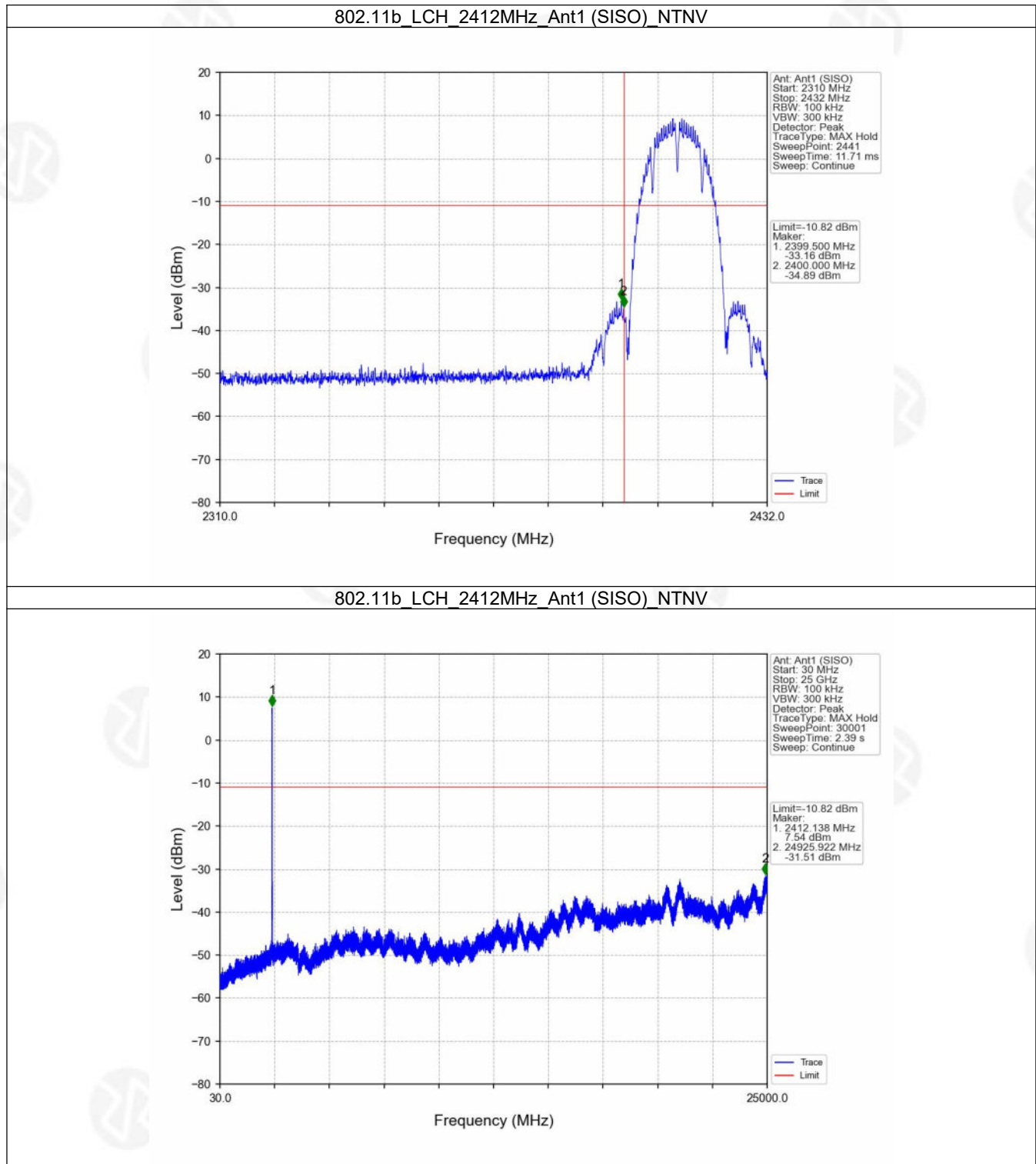
5.2.1 Test Result

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
802.11b	SISO	2412	1	9.18	-10.82	Pass
		2437	1	9.35	-10.65	Pass
		2462	1	9.63	-10.37	Pass
802.11g	SISO	2412	1	2.33	-17.67	Pass
		2437	1	2.03	-17.97	Pass
		2462	1	1.90	-18.10	Pass
802.11n (HT20)	SISO	2412	1	2.31	-17.69	Pass
		2437	1	1.90	-18.10	Pass
		2462	1	2.03	-17.97	Pass
802.11n (HT40)	SISO	2422	1	-0.76	-20.76	Pass
		2437	1	-0.78	-20.78	Pass
		2452	1	-0.58	-20.58	Pass

Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.

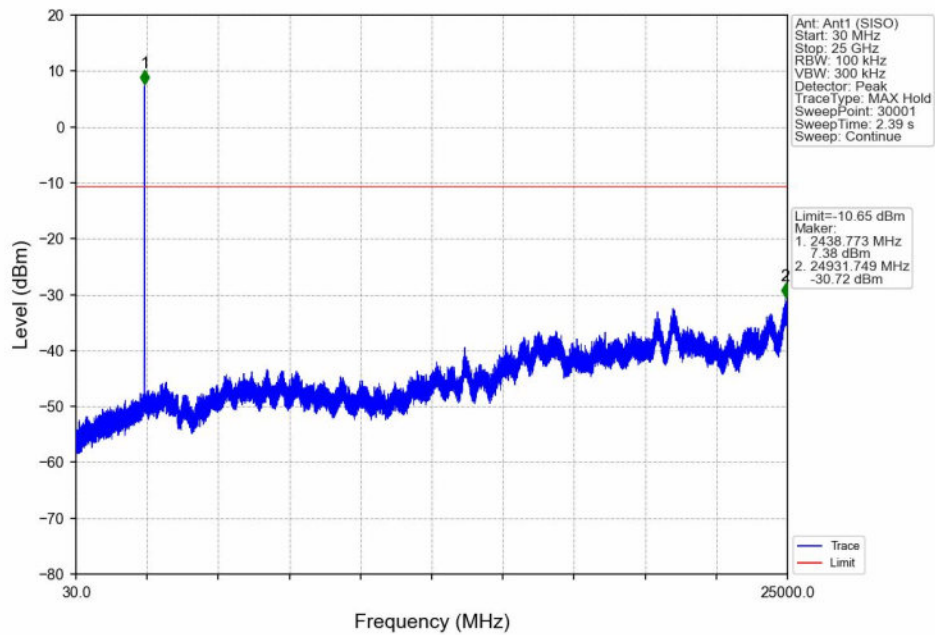


5.2.2 Test Graph

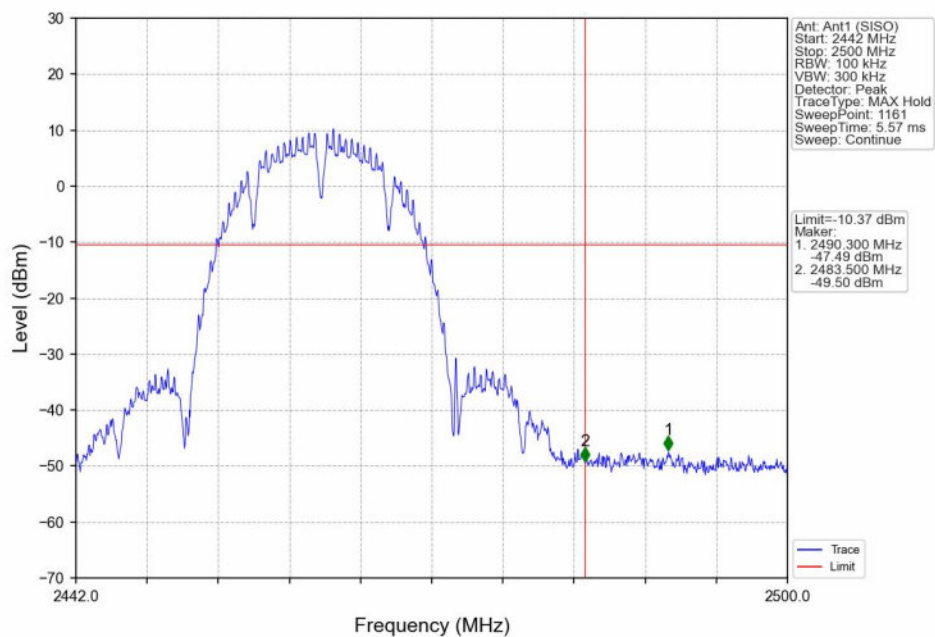




802.11b_MCH_2437MHz_Ant1 (SISO)_NTNV

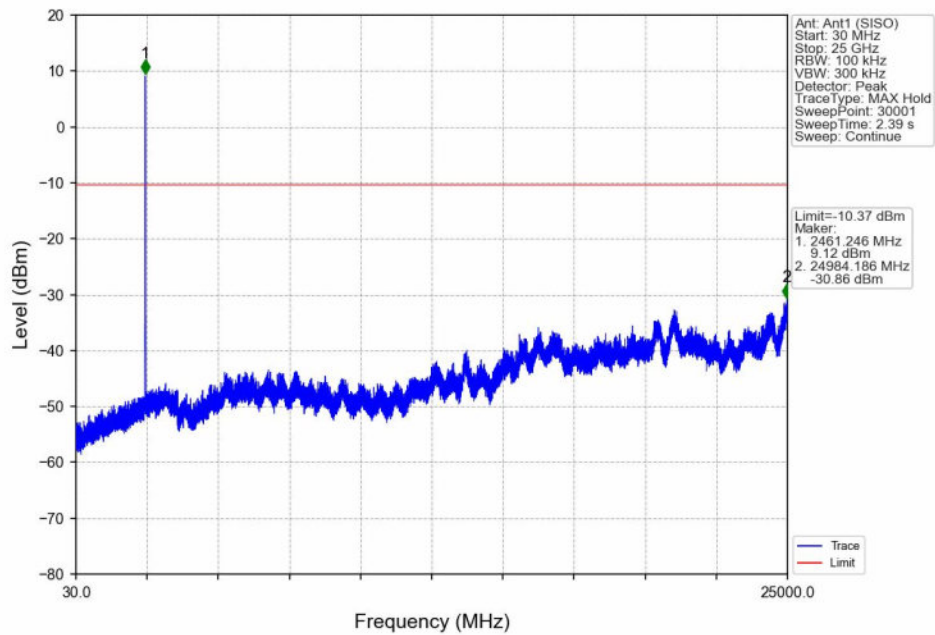


802.11b_HCH_2462MHz_Ant1 (SISO)_NTNV

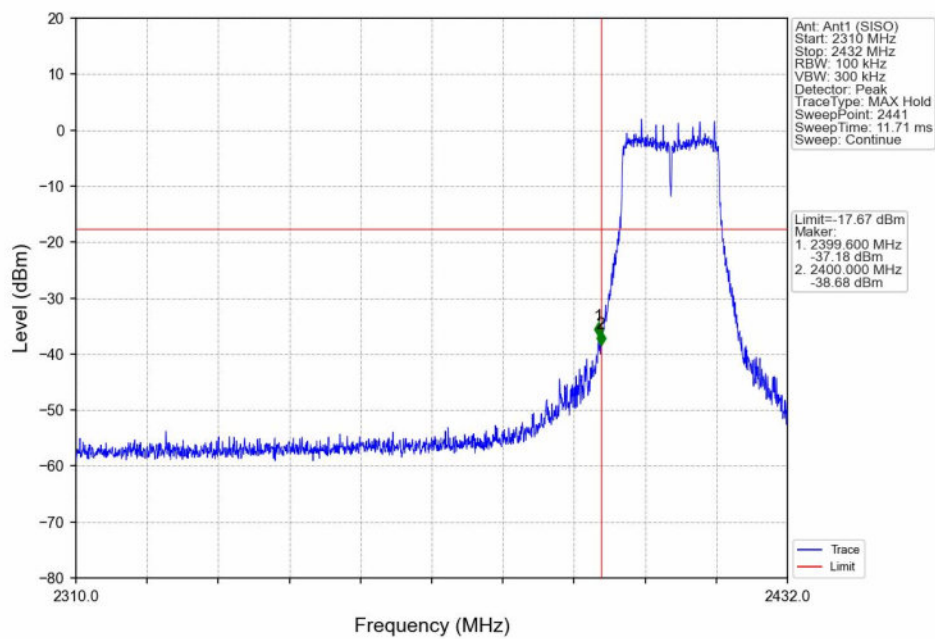




802.11b_HCH_2462MHz_Ant1 (SISO)_NTNV

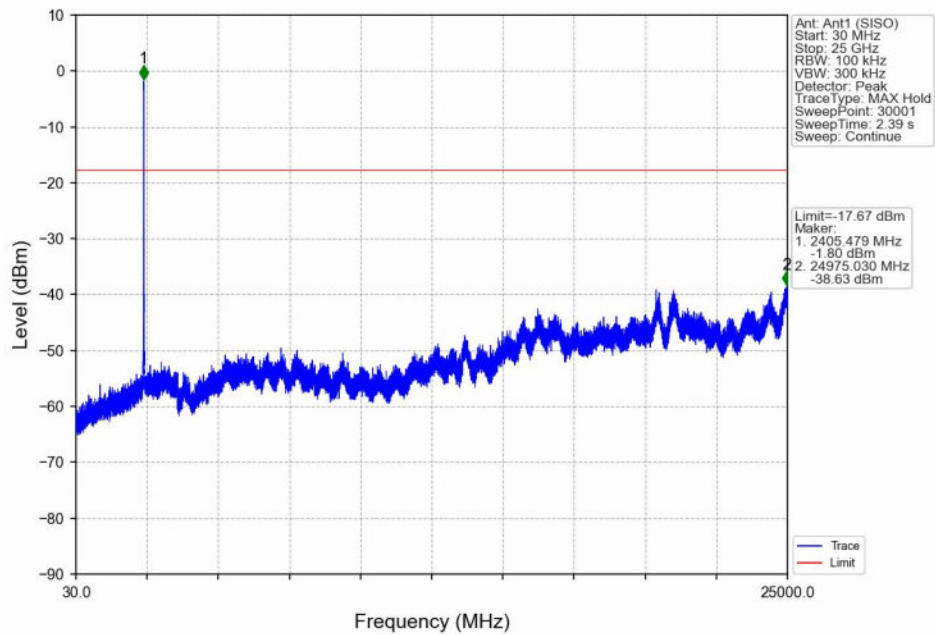


802.11g_LCH_2412MHz_Ant1 (SISO)_NTNV

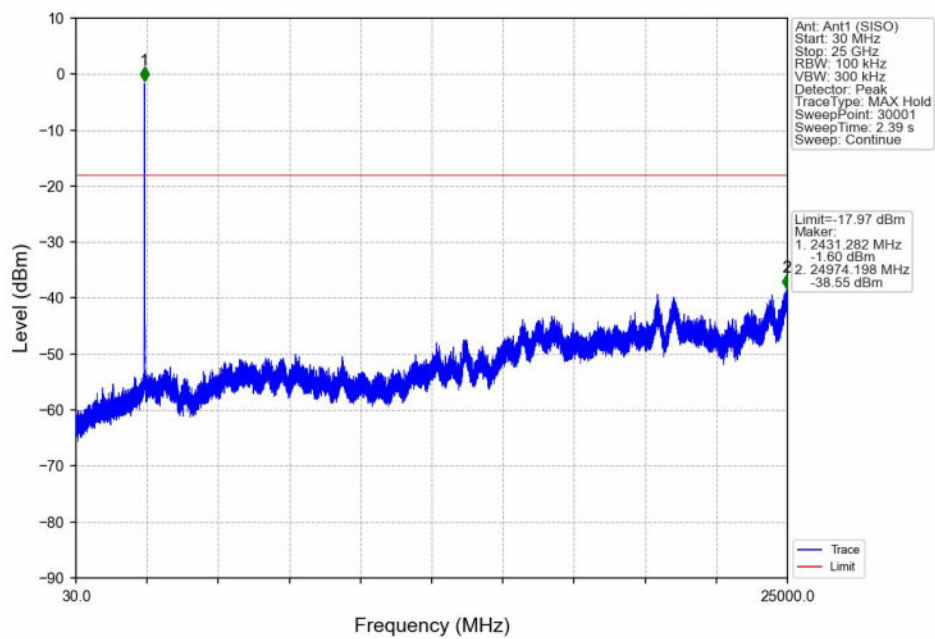




802.11g_LCH_2412MHz_Ant1 (SISO)_NTNV

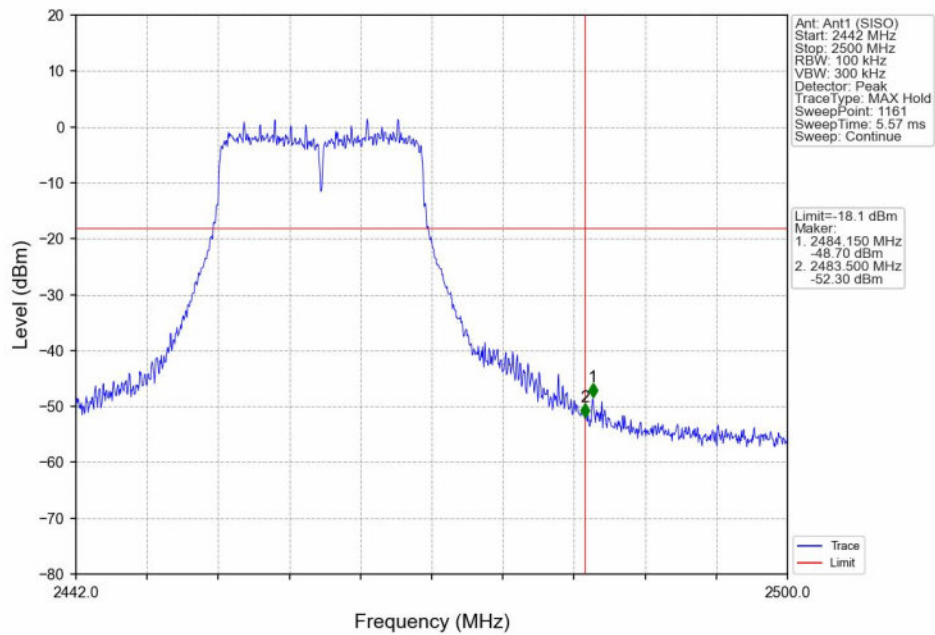


802.11g_MCH_2437MHz_Ant1 (SISO)_NTNV

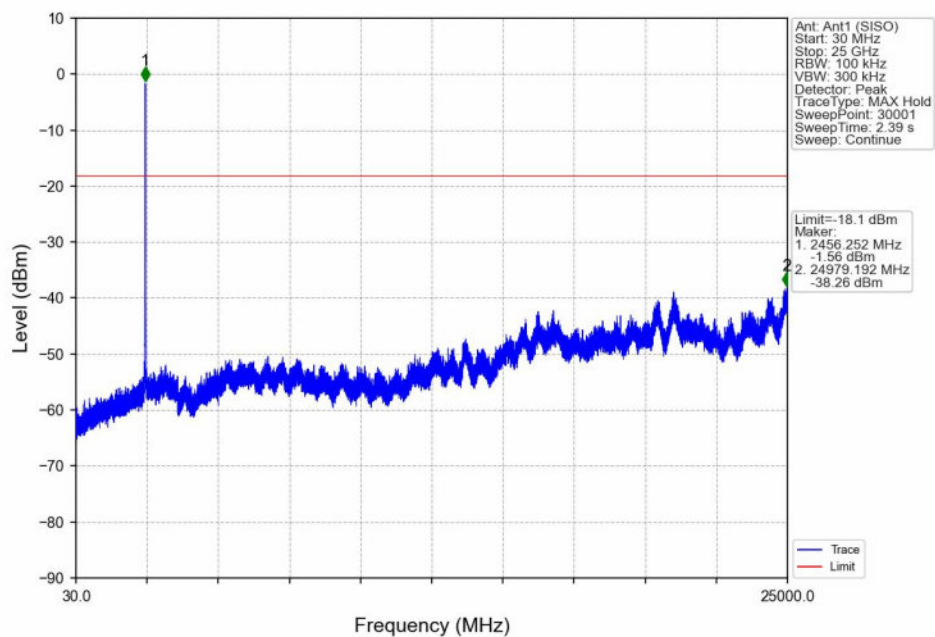




802.11g_HCH_2462MHz_Ant1 (SISO)_NTNV

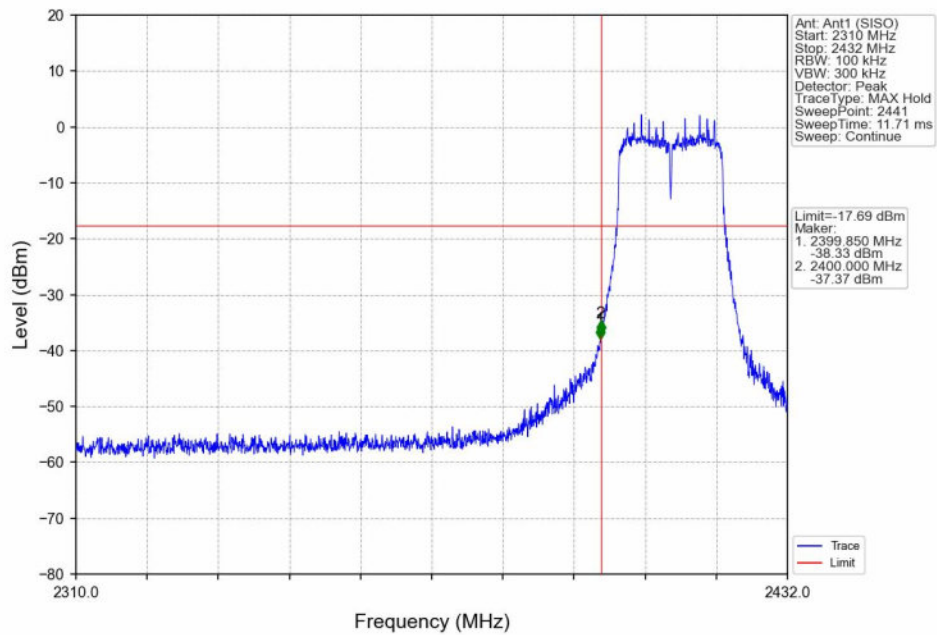


802.11g_HCH_2462MHz_Ant1 (SISO)_NTNV

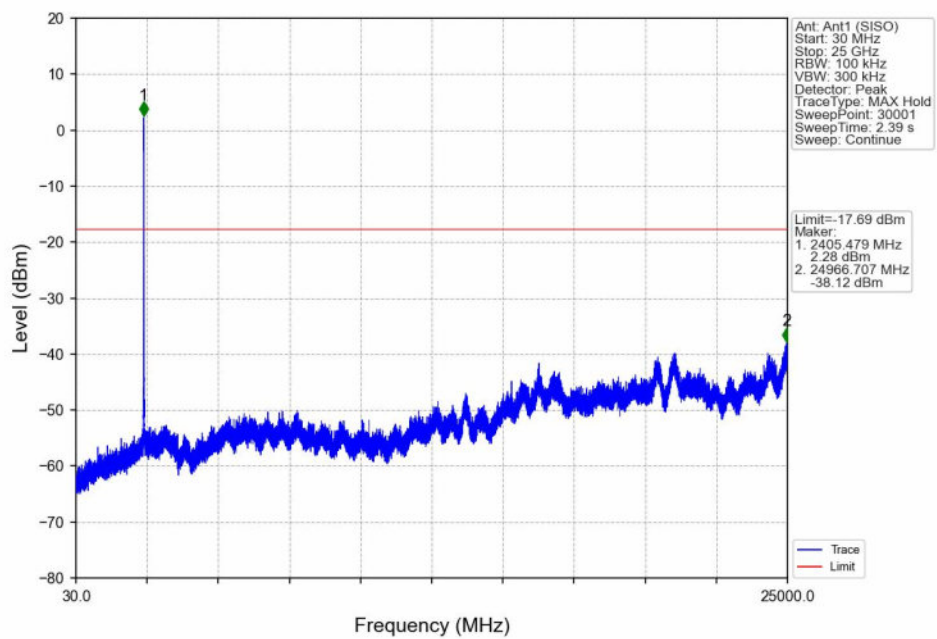




802.11n(HT20)_LCH_2412MHz_Ant1 (SISO)_NTNV

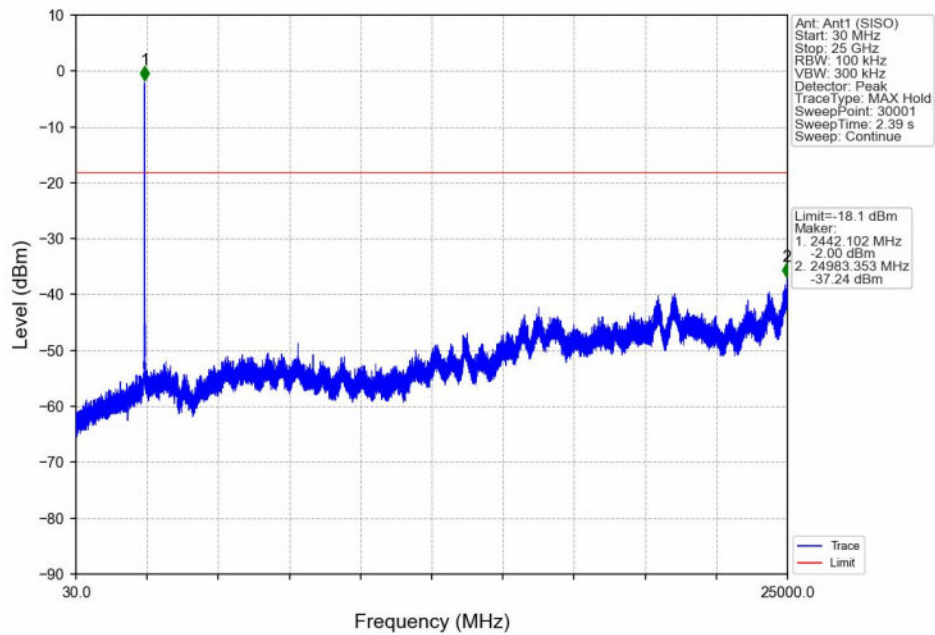


802.11n(HT20)_LCH_2412MHz_Ant1 (SISO)_NTNV

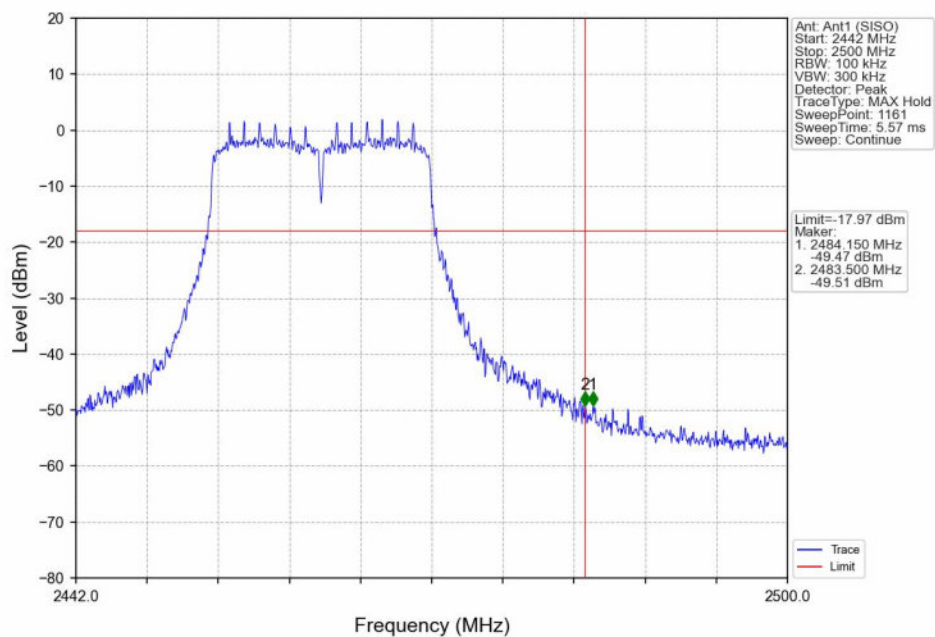




802.11n(HT20)_MCH_2437MHz_Ant1 (SISO)_NTNV

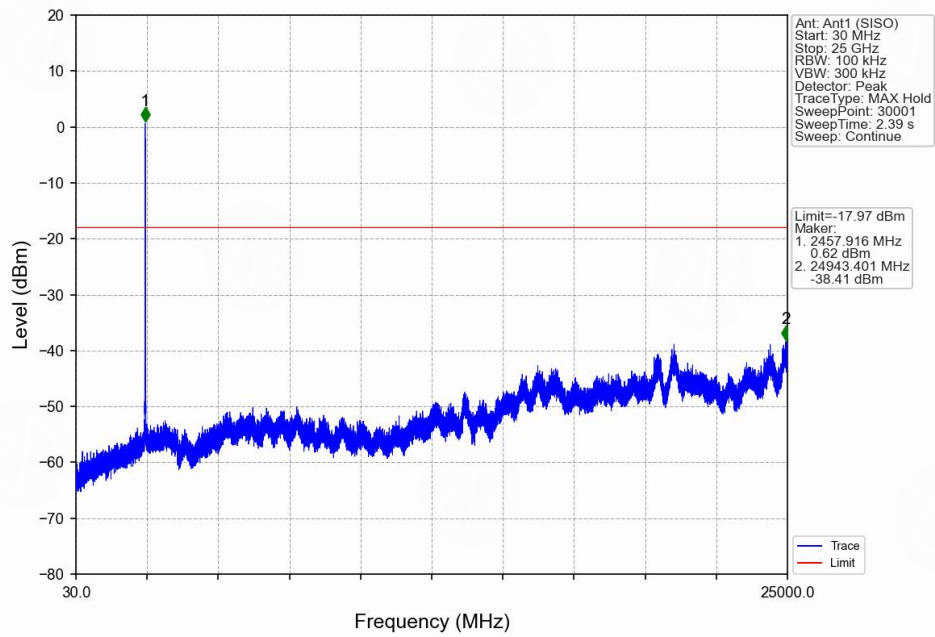


802.11n(HT20)_HCH_2462MHz_Ant1 (SISO)_NTNV

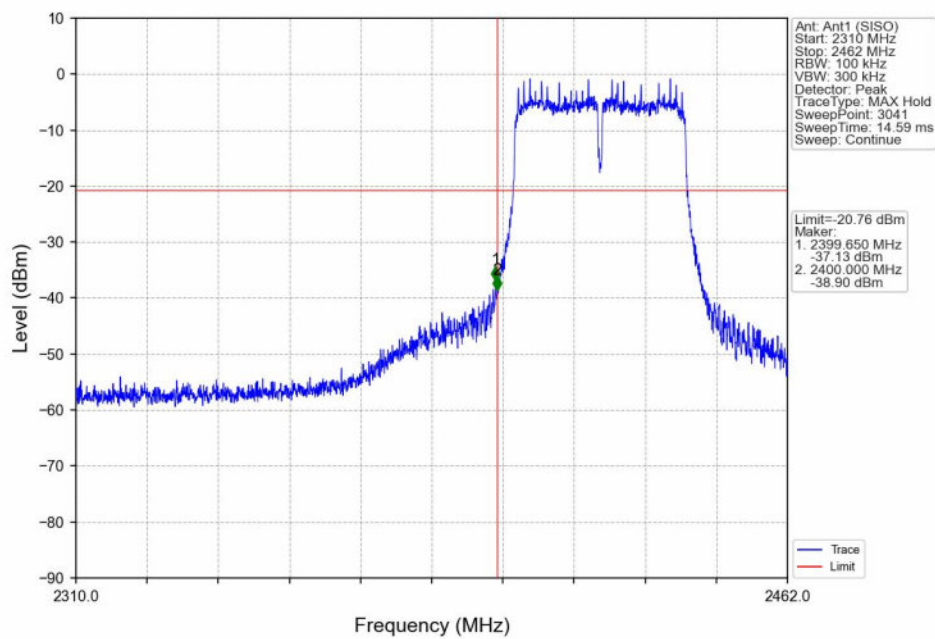




802.11n(HT20)_HCH_2462MHz_Ant1 (SISO)_NTNV

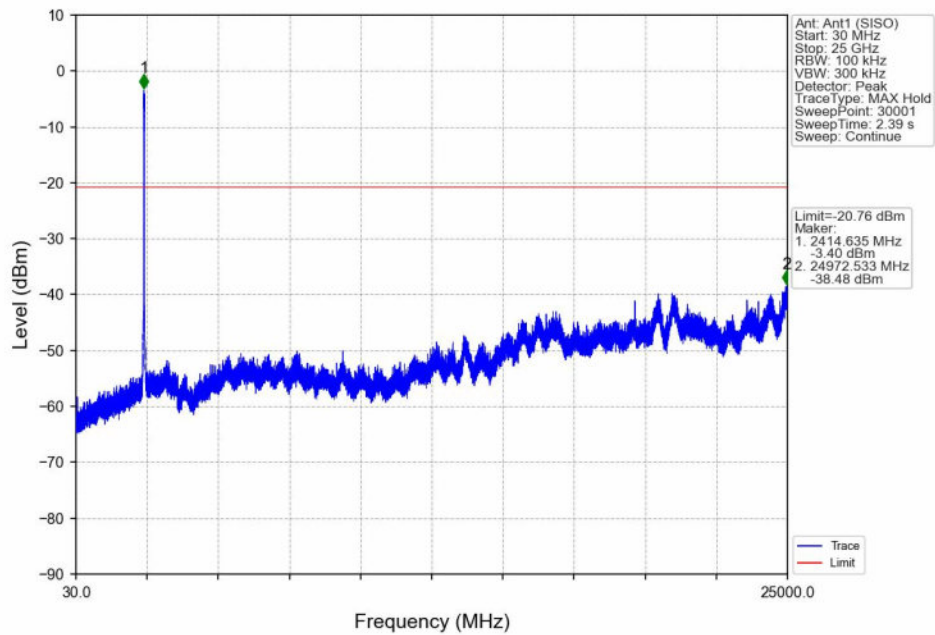


802.11n(HT40)_LCH_2422MHz_Ant1 (SISO)_NTNV

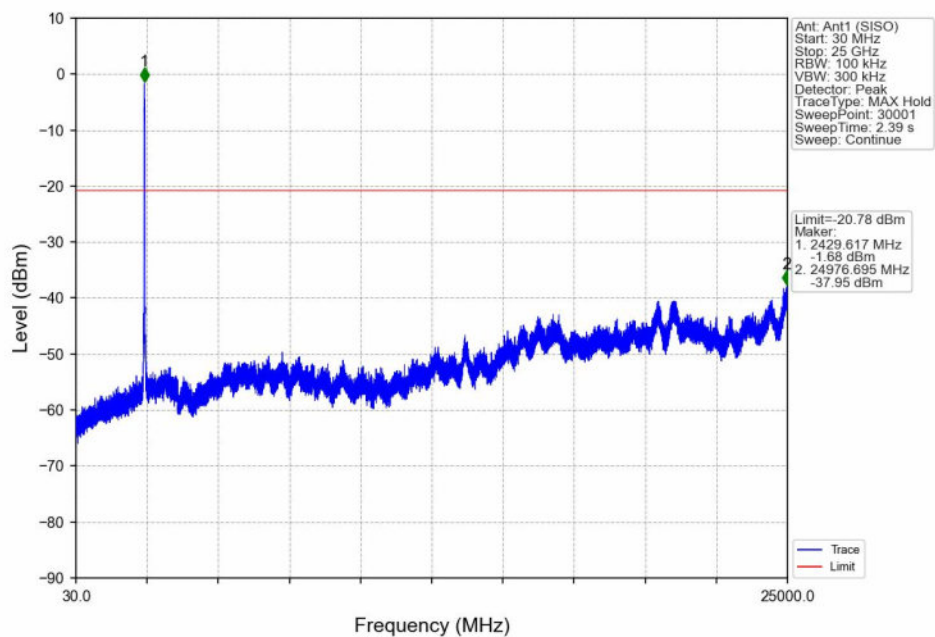




802.11n(HT40)_LCH_2422MHz_Ant1 (SISO)_NTNV

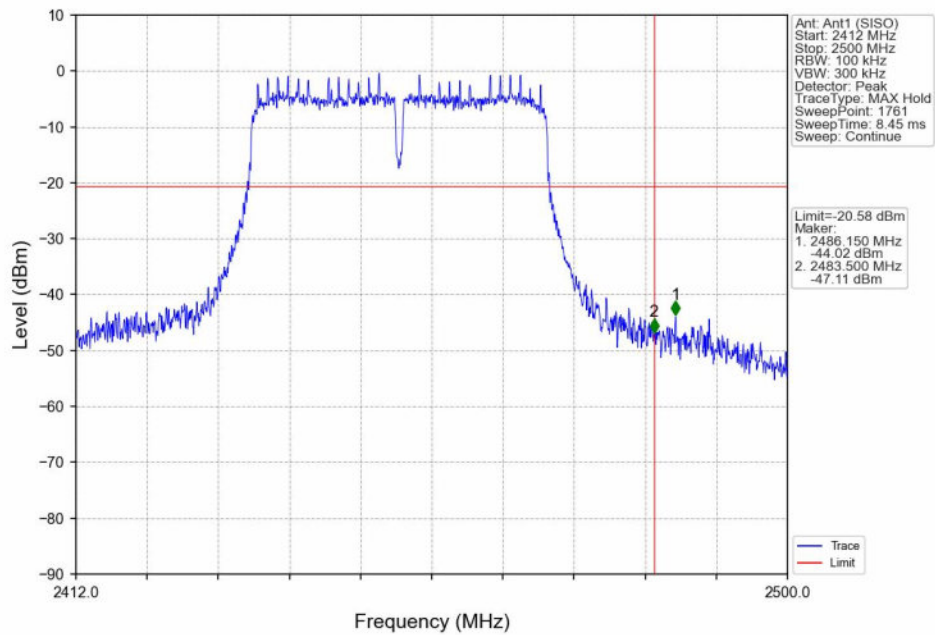


802.11n(HT40)_MCH_2437MHz_Ant1 (SISO)_NTNV

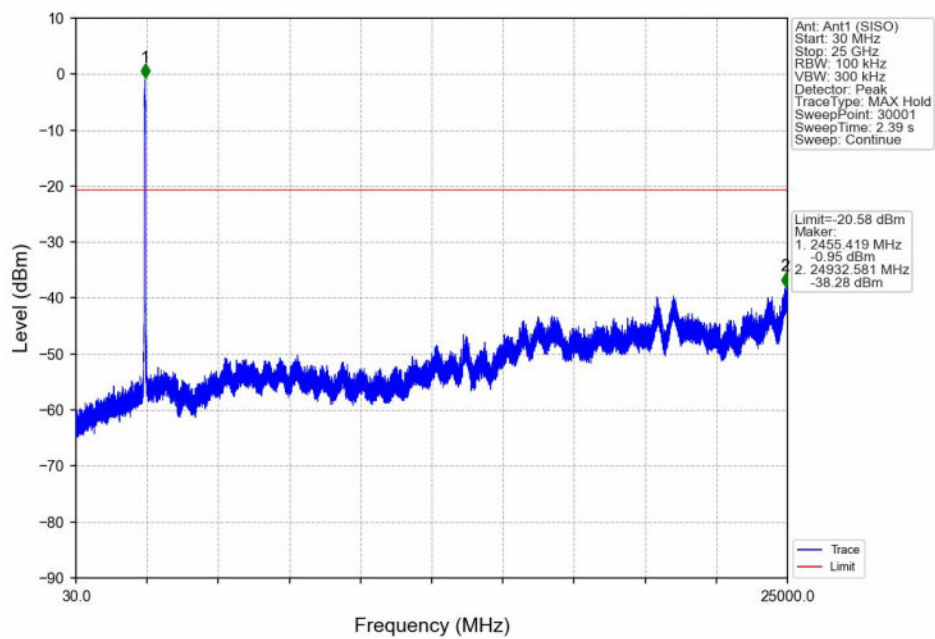




802.11n(HT40)_HCH_2452MHz_Ant1 (SISO)_NTNV



802.11n(HT40)_HCH_2452MHz_Ant1 (SISO)_NTNV





6. Form731

6.1 Form731

6.1.1 Test Result

Lower Freq (MHz)	High Freq (MHz)	MAX Power (W)	MAX Power (dBm)
2412	2462	0.1521	21.82
2422	2452	0.1365	21.35