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Annex for 2.4G Wi-Fi

Test Report No.: CTL2508212021-WF03

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1. Bandwidth**1.1 Test Result****1.1.1 OBW**

Mode	TX Type	Frequency (MHz)	ANT	99% Occupied Bandwidth (MHz)		Verdict
				Result	Limit	
802.11b	SISO	2412	1	12.749	/	Pass
		2437	1	12.665	/	Pass
		2462	1	12.853	/	Pass
802.11g	SISO	2412	1	17.285	/	Pass
		2437	1	17.262	/	Pass
		2462	1	17.416	/	Pass
802.11n (HT20)	SISO	2412	1	18.106	/	Pass
		2437	1	18.147	/	Pass
		2462	1	18.179	/	Pass
802.11n (HT40)	SISO	2422	1	36.516	/	Pass
		2437	1	36.175	/	Pass
		2452	1	36.167	/	Pass

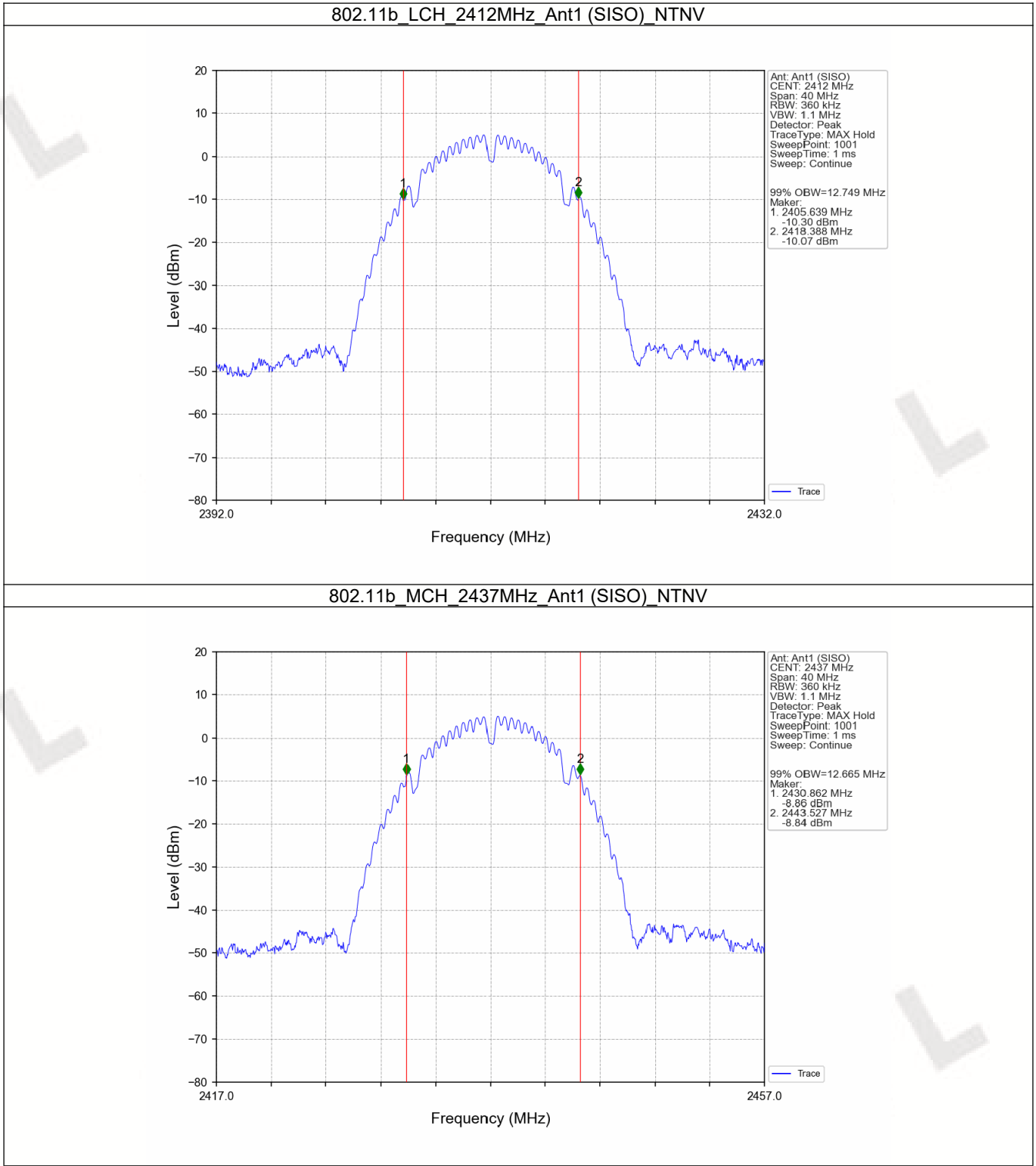
1.1.2 6dB BW

Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
802.11b	SISO	2412	1	8.230	≥ 0.5	Pass
		2437	1	8.202	≥ 0.5	Pass
		2462	1	8.248	≥ 0.5	Pass
802.11g	SISO	2412	1	16.141	≥ 0.5	Pass
		2437	1	15.688	≥ 0.5	Pass
		2462	1	16.198	≥ 0.5	Pass
802.11n (HT20)	SISO	2412	1	17.232	≥ 0.5	Pass
		2437	1	16.868	≥ 0.5	Pass
		2462	1	17.515	≥ 0.5	Pass
802.11n (HT40)	SISO	2422	1	35.848	≥ 0.5	Pass
		2437	1	34.393	≥ 0.5	Pass
		2452	1	35.195	≥ 0.5	Pass

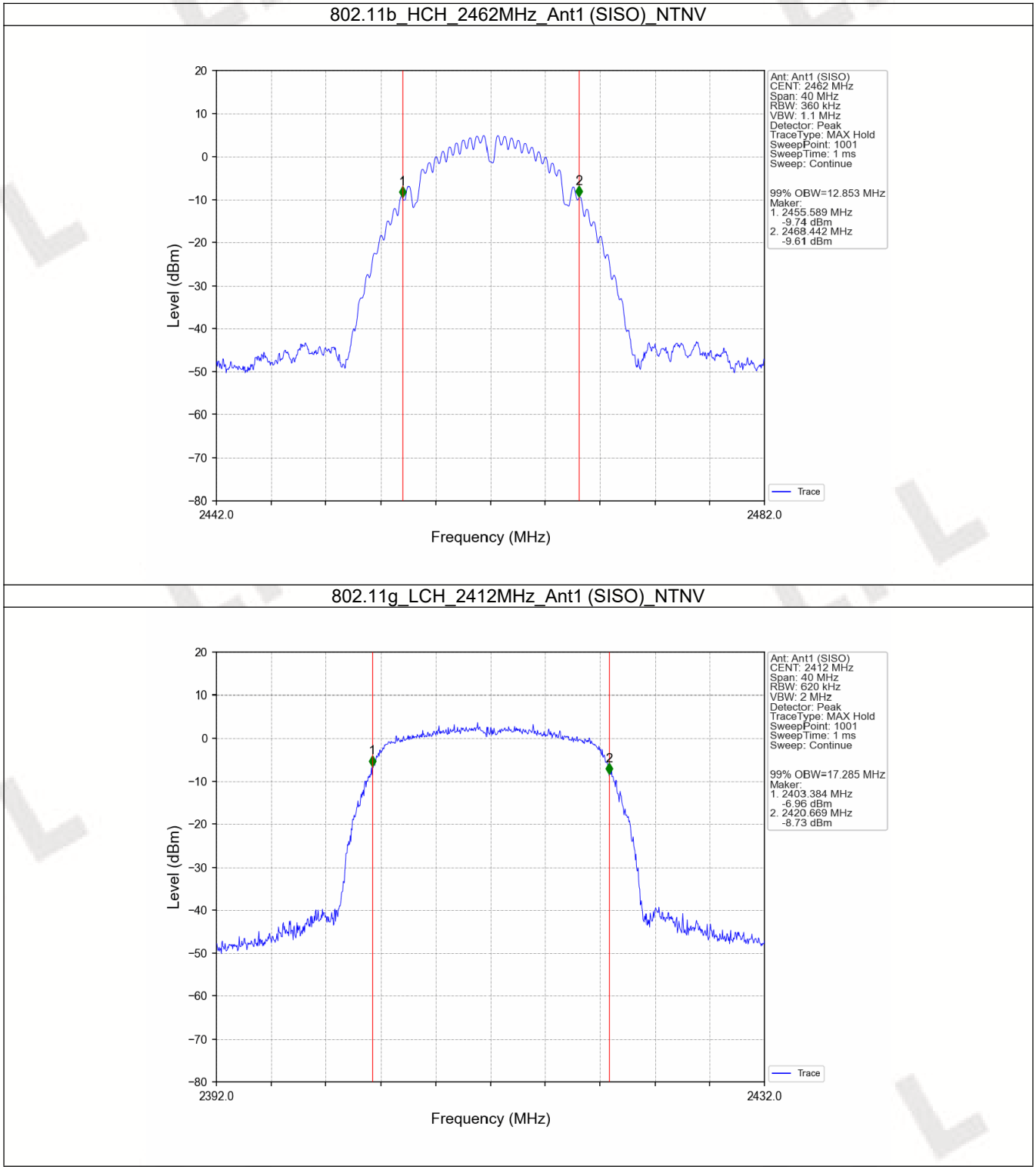
FCC ID: 2BDI3-RUGGEDULTRA

1.2 Test Graph

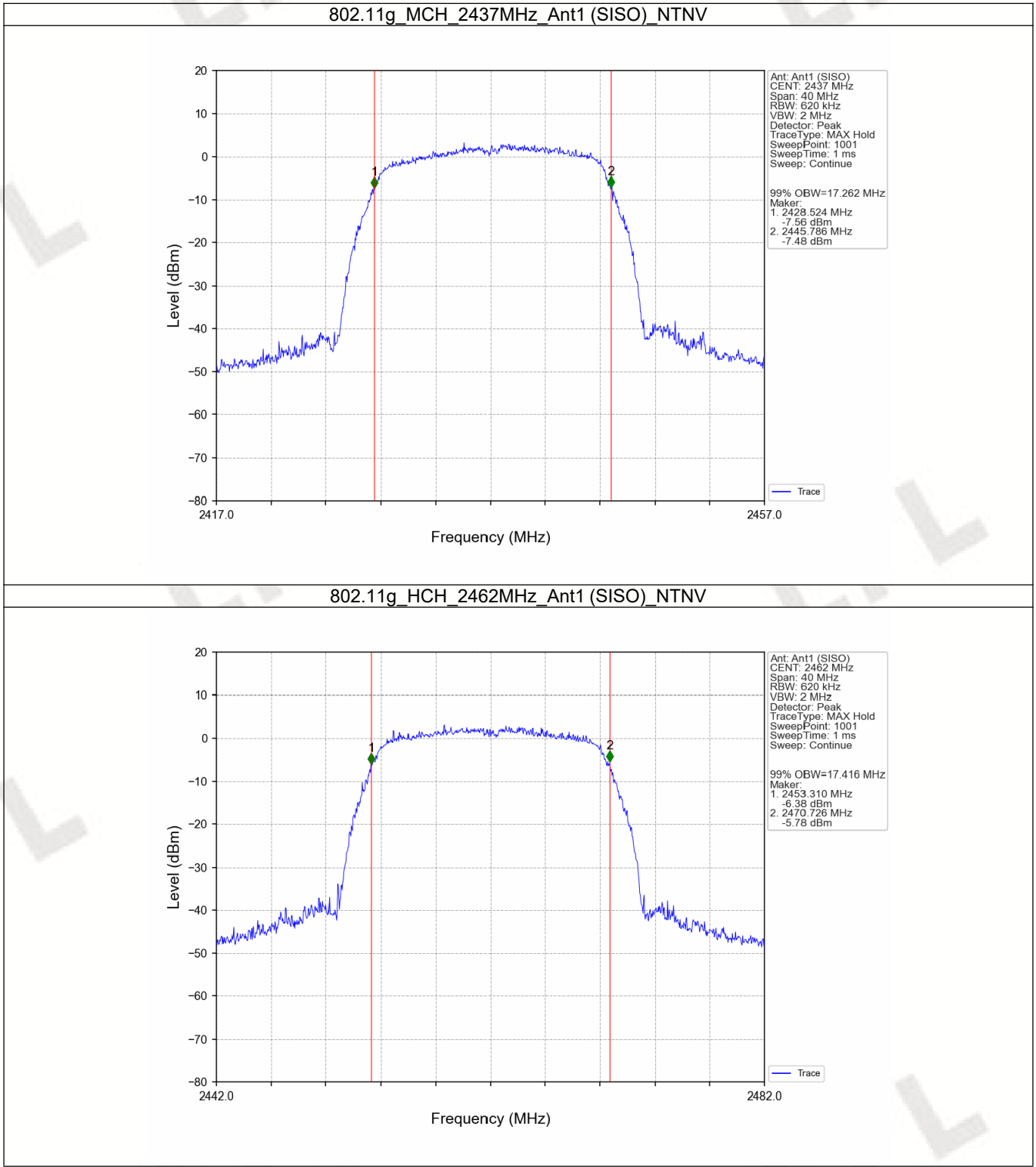
1.2.1 OBW



FCC ID: 2BDI3-RUGGEDULTRA

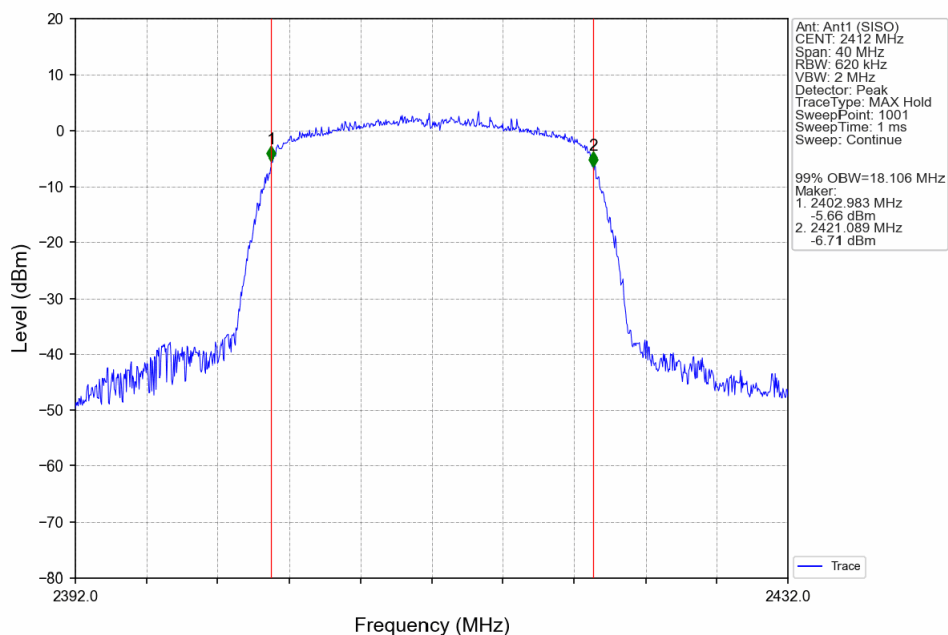


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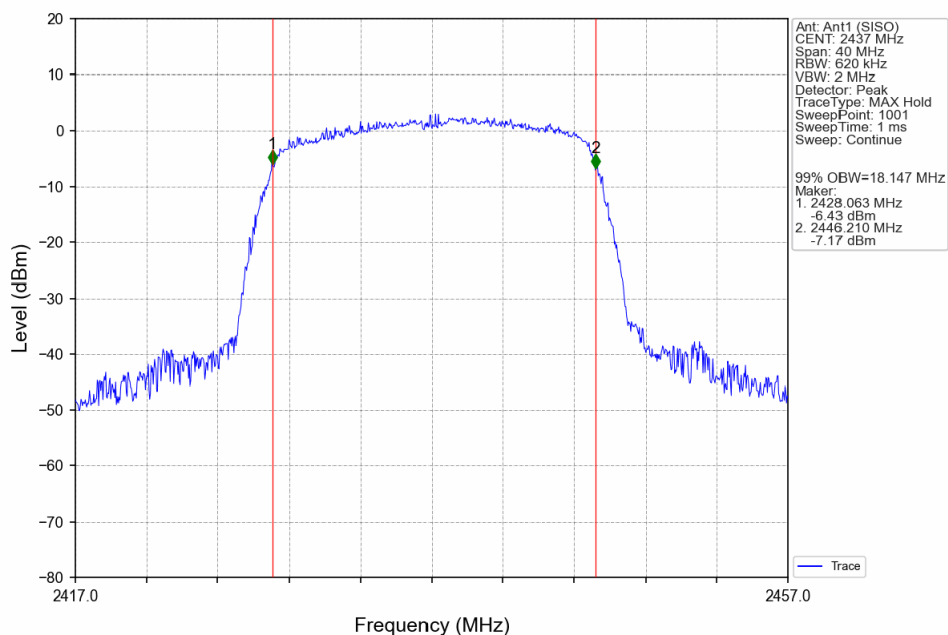


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802.11n(HT20)_LCH_2412MHz_Ant1 (SISO)_NTNV

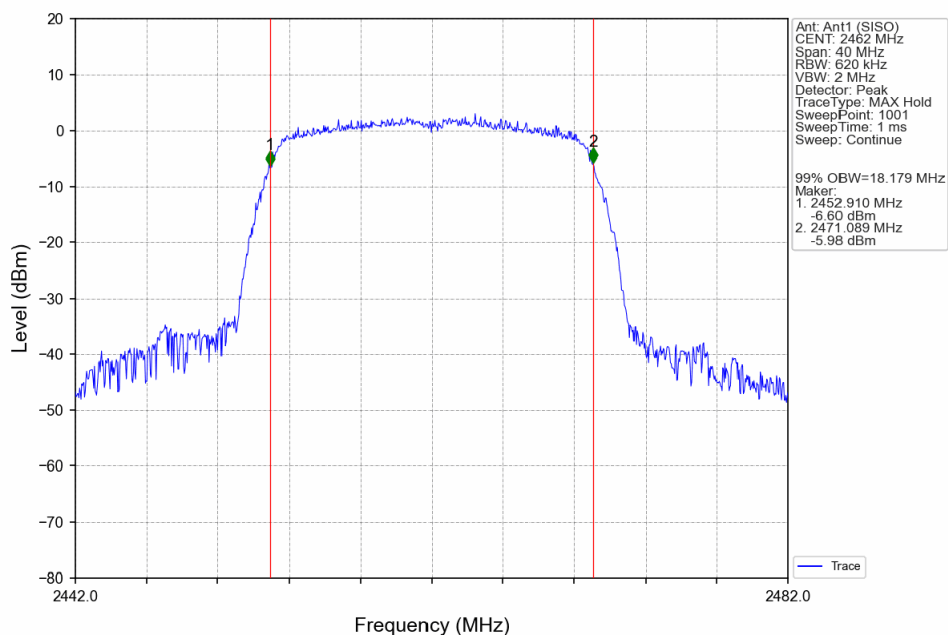


802.11n(HT20)_MCH_2437MHz_Ant1 (SISO)_NTNV

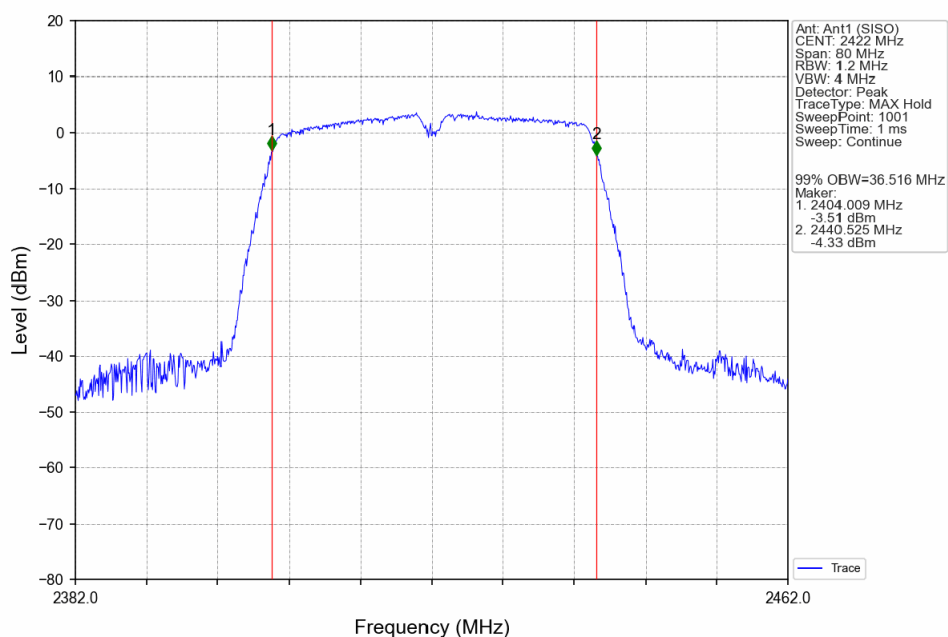


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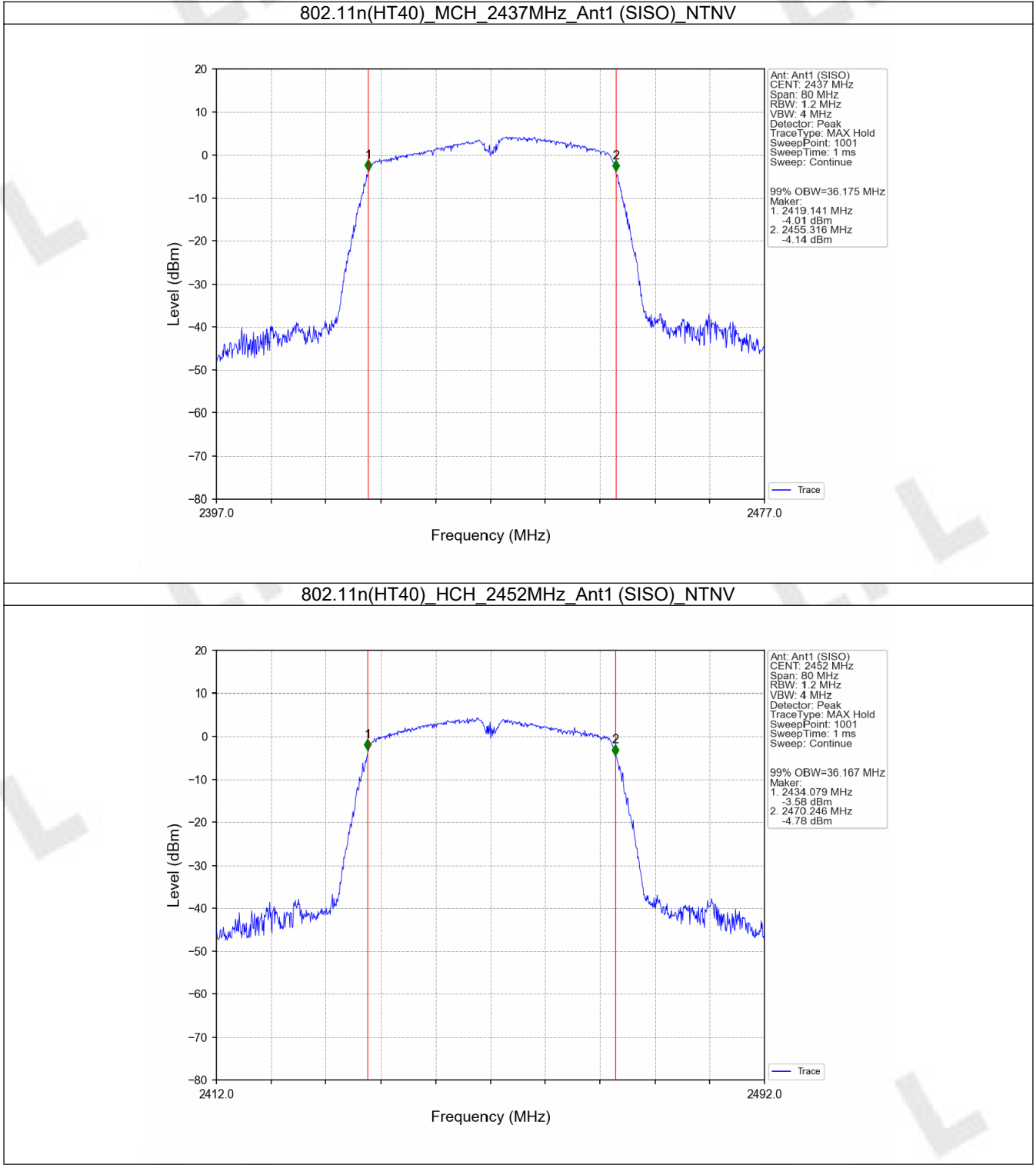
802.11n(HT20)_HCH_2462MHz_Ant1 (SISO)_NTNV



802.11n(HT40)_LCH_2422MHz_Ant1 (SISO)_NTNV

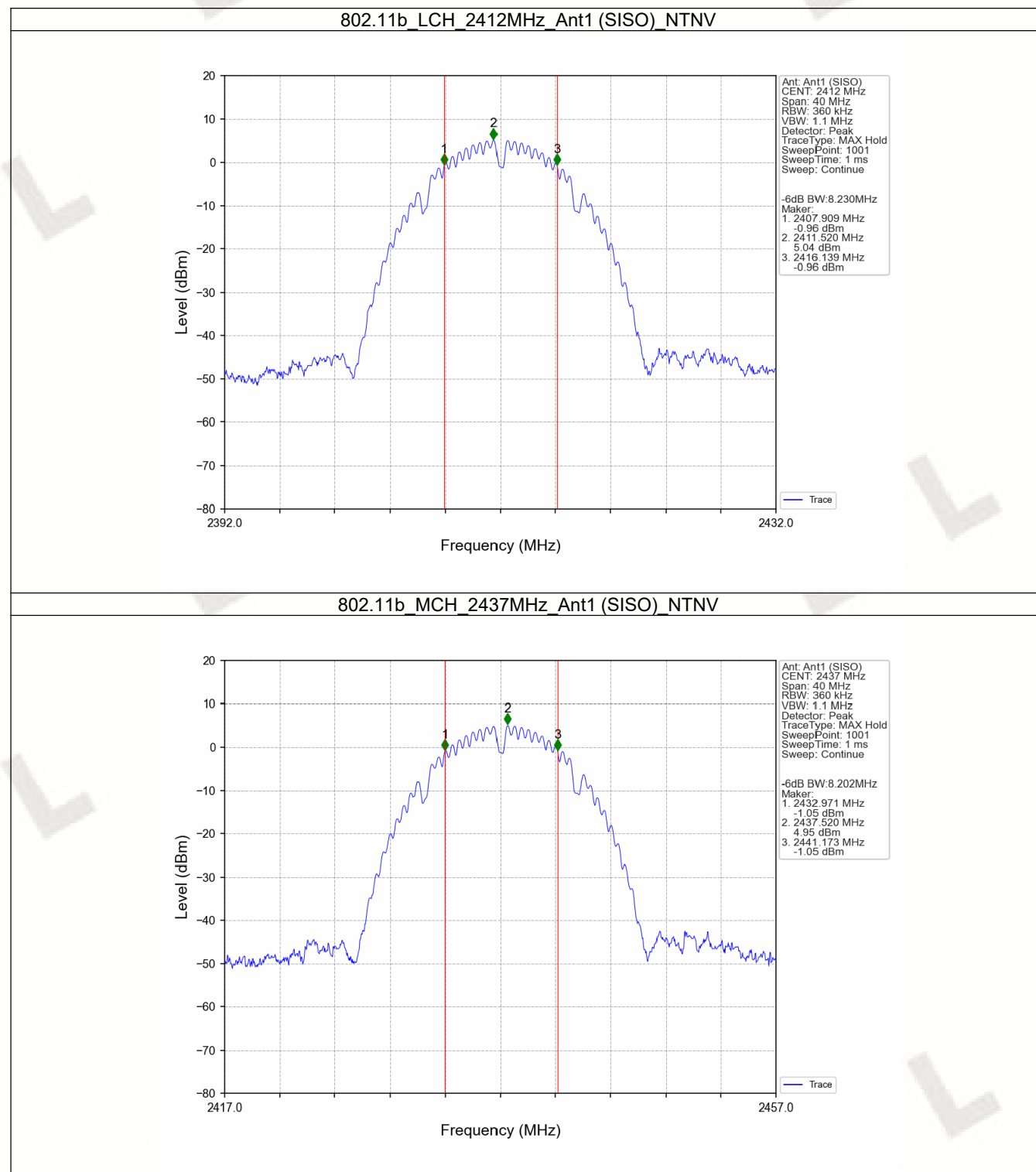


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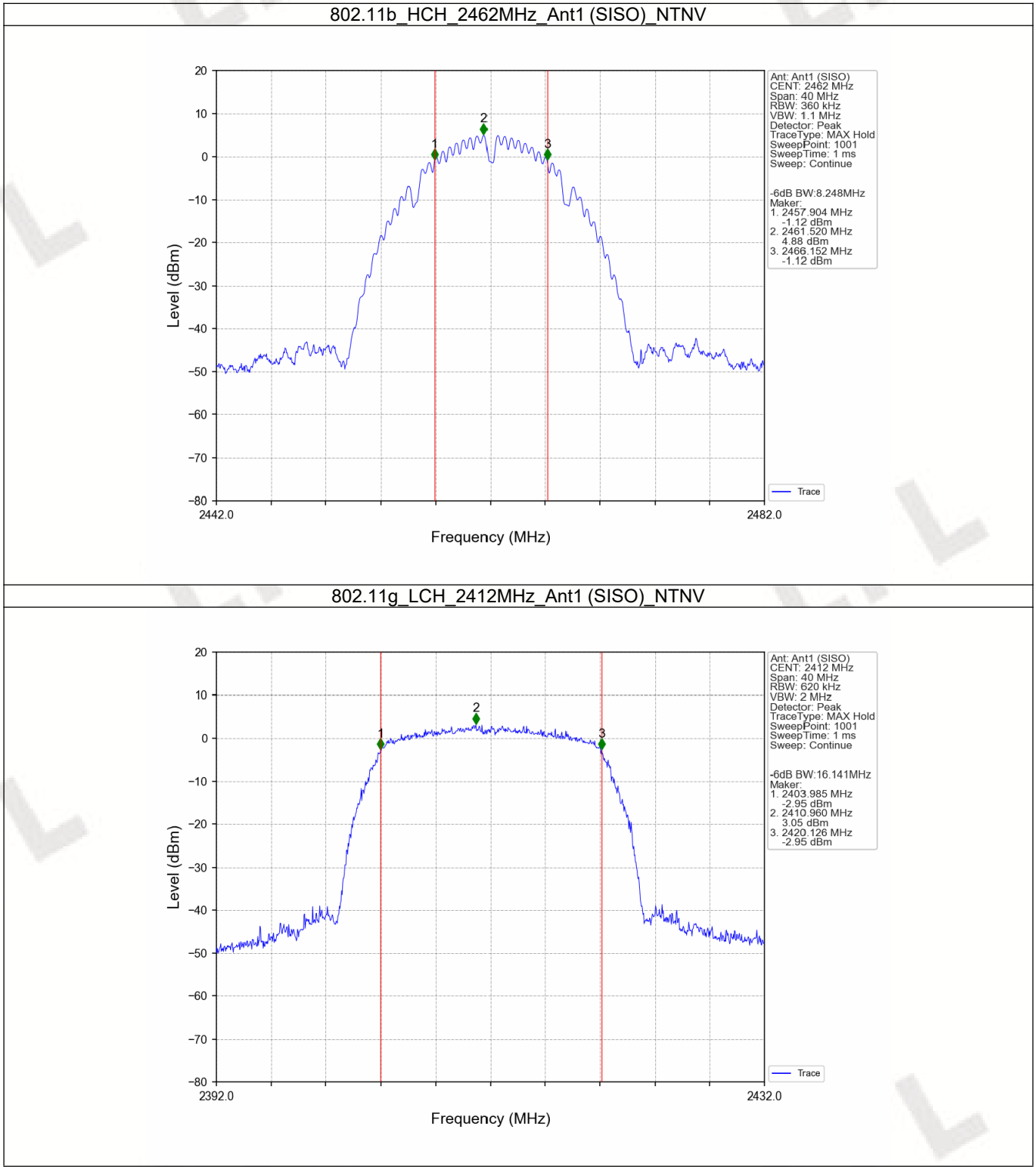


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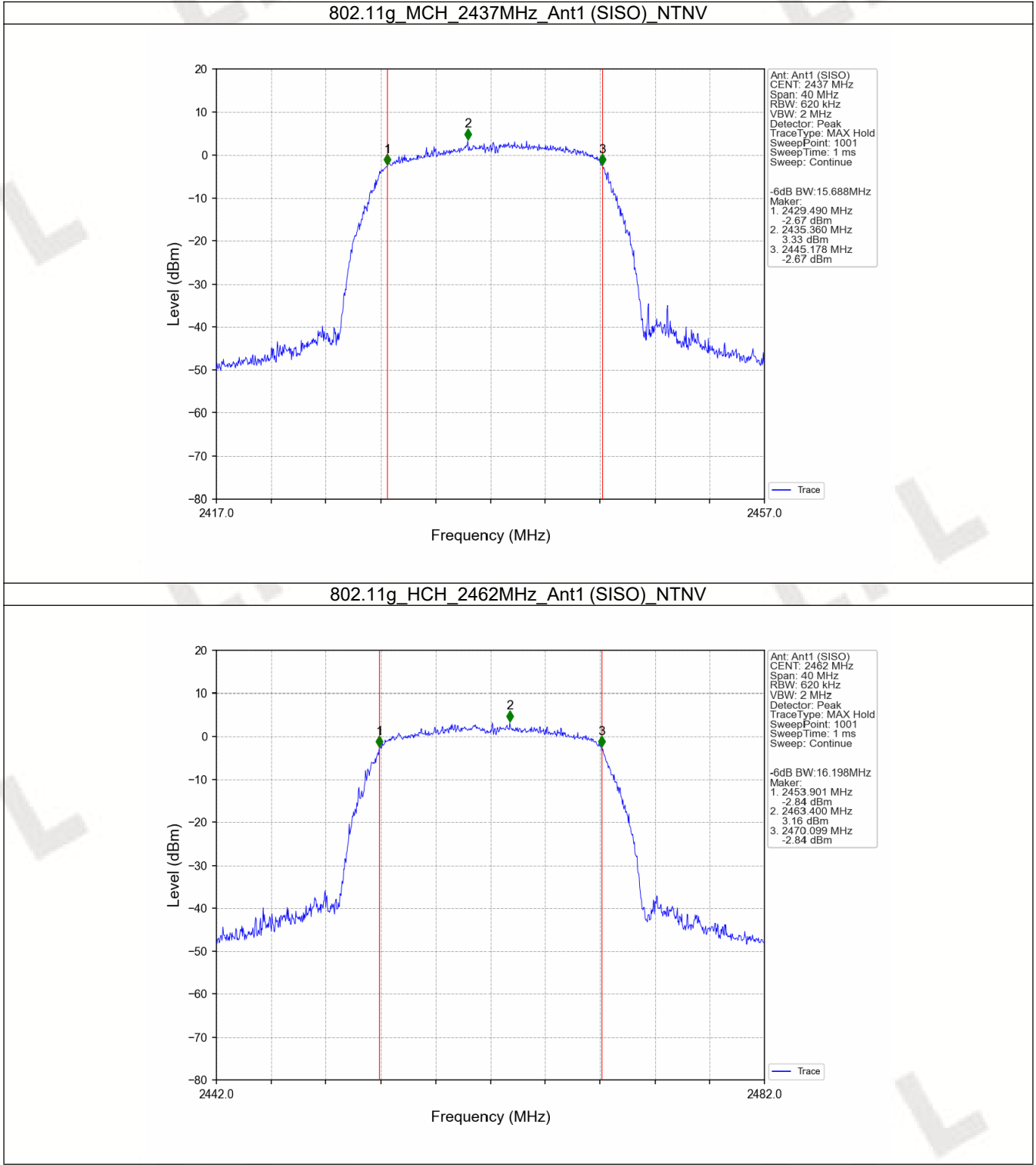
1.2.2 6dB BW



FCC ID: 2BDI3-RUGGEDULTRA

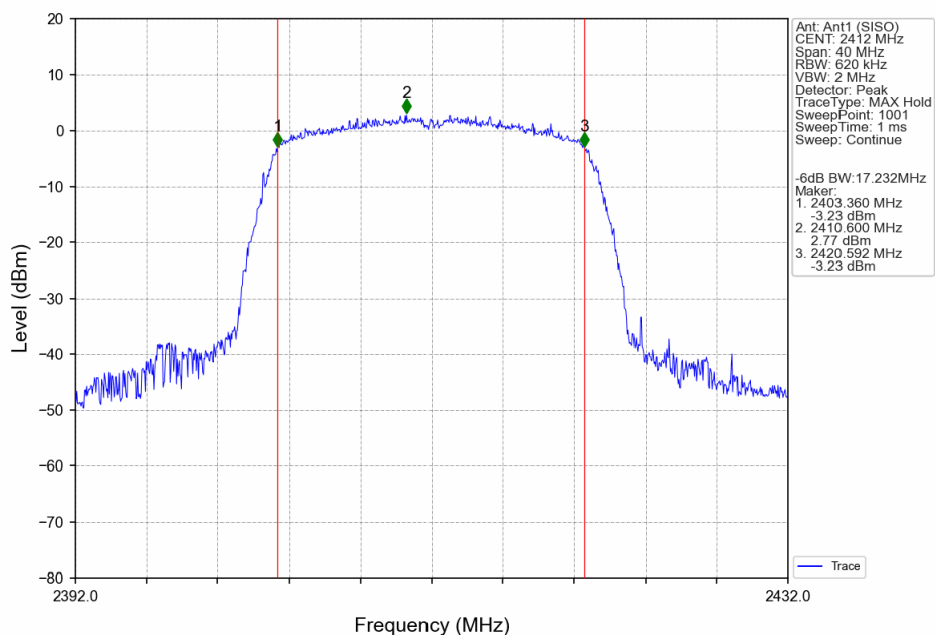


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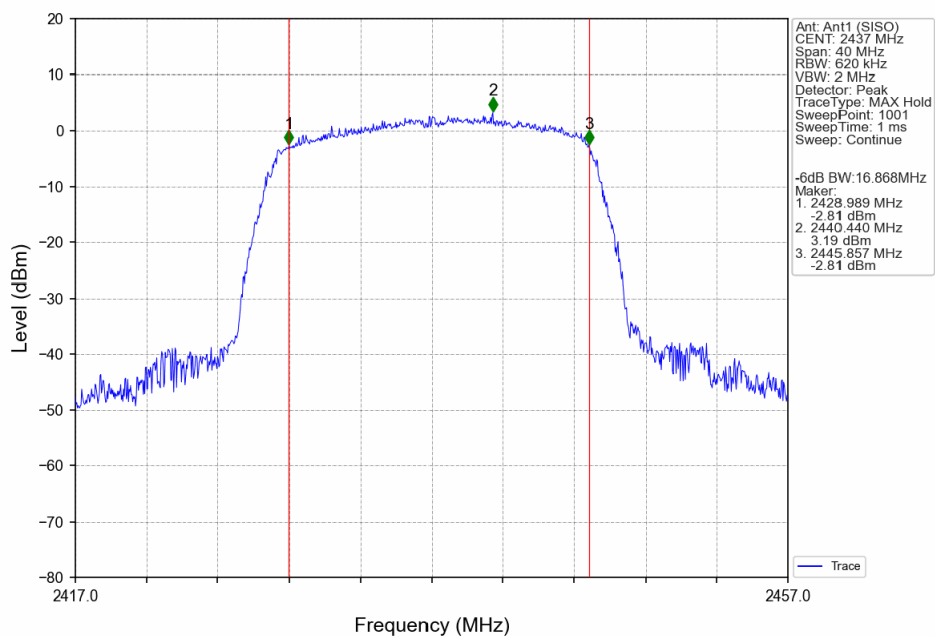


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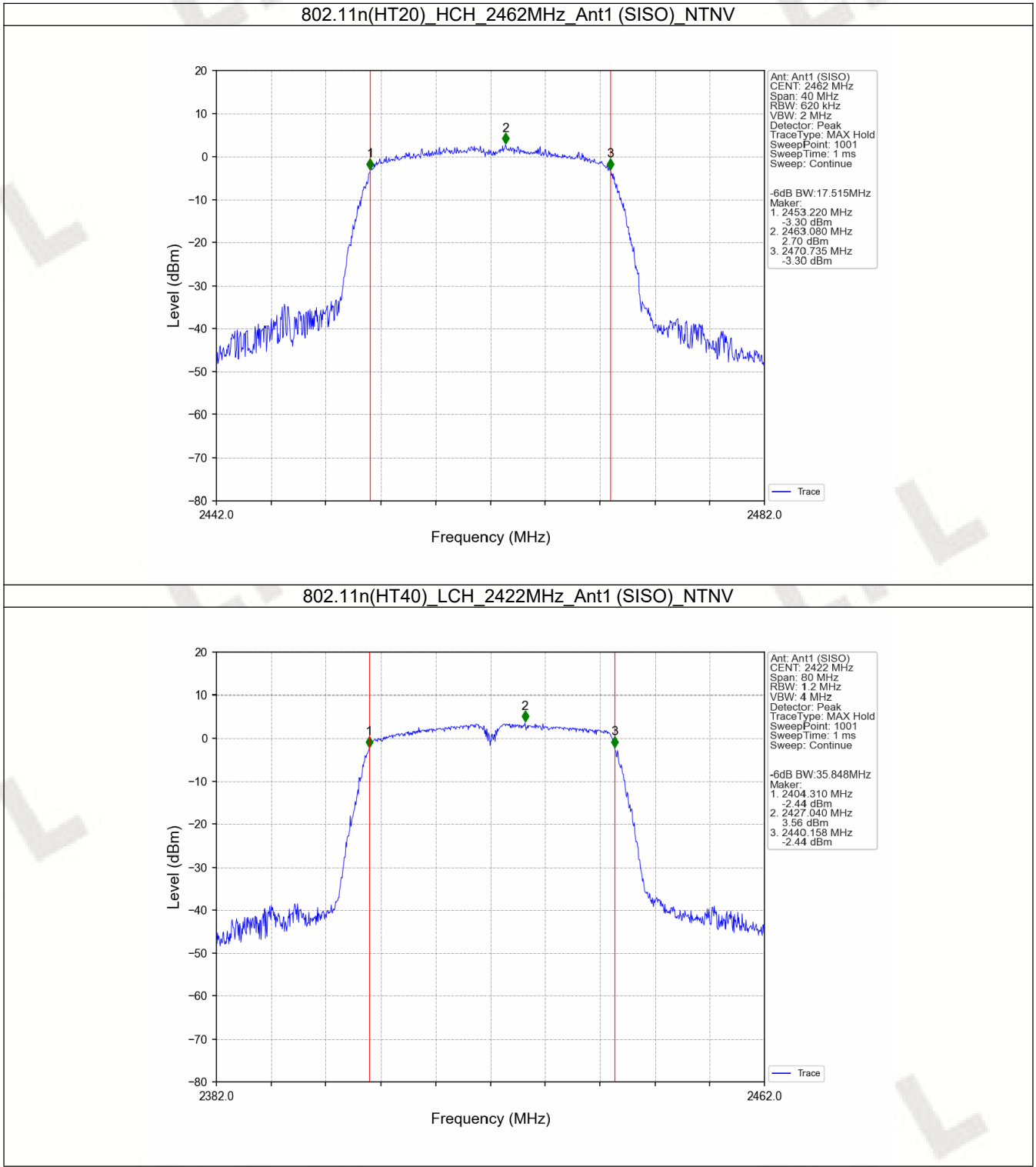
802.11n(HT20)_LCH_2412MHz_Ant1 (SISO)_NTNV



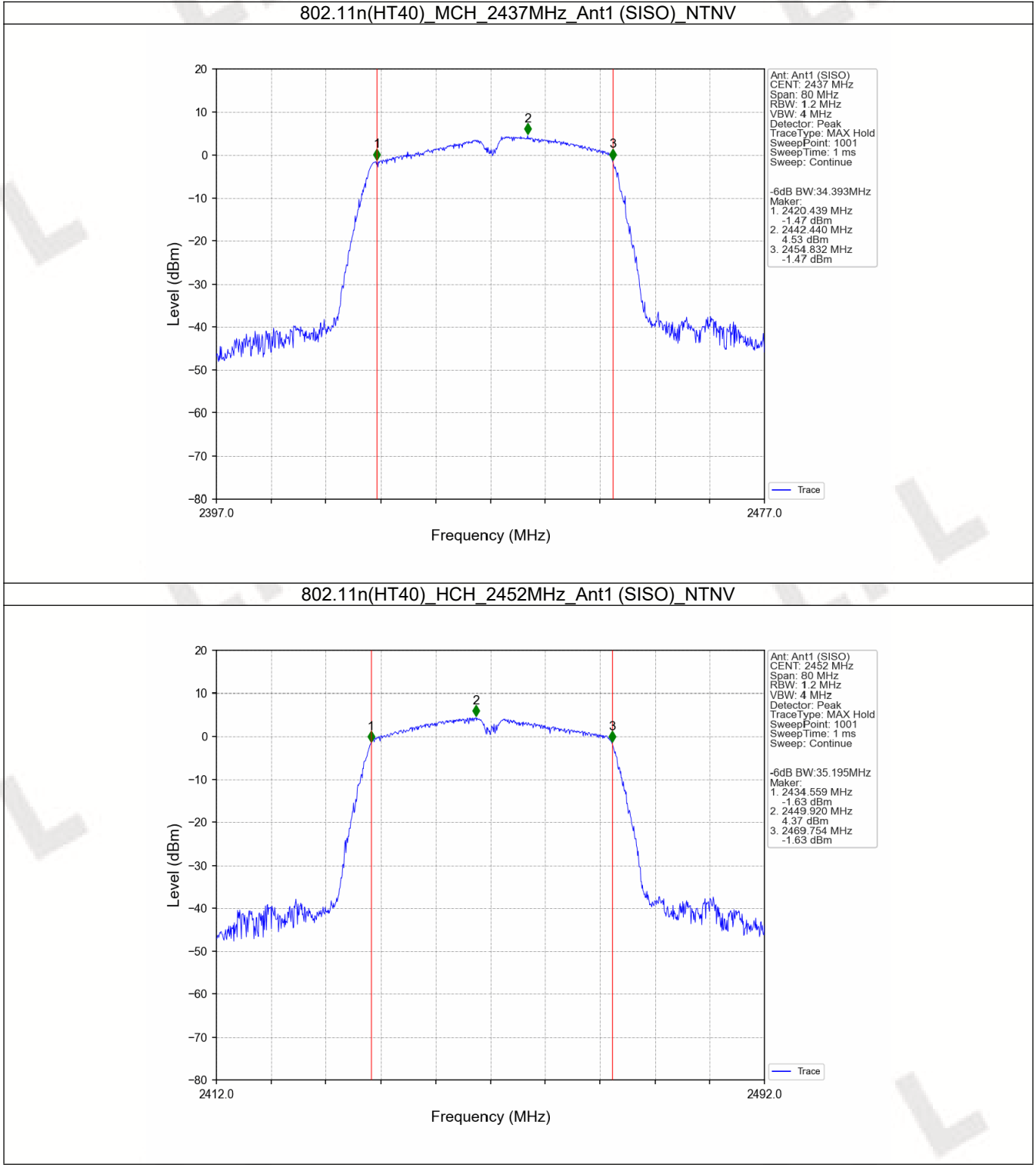
802.11n(HT20)_MCH_2437MHz_Ant1 (SISO)_NTNV



FCC ID: 2BDI3-RUGGEDULTRA



FCC ID: 2BDI3-RUGGEDULTRA



FCC ID: 2BDI3-RUGGEDULTRA

2. Maximum Conducted Output Power**2.1 Test Result****2.1.1 Power**

Mode	TX Type	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)		Verdict
			ANT1	Limit	
802.11b	SISO	2412	15.18	<=30	Pass
		2437	15.01	<=30	Pass
		2462	15.08	<=30	Pass
802.11g	SISO	2412	15.64	<=30	Pass
		2437	15.50	<=30	Pass
		2462	15.61	<=30	Pass
802.11n (HT20)	SISO	2412	15.56	<=30	Pass
		2437	15.51	<=30	Pass
		2462	15.65	<=30	Pass
802.11n (HT40)	SISO	2422	15.82	<=30	Pass
		2437	15.76	<=30	Pass
		2452	16.03	<=30	Pass

Note1: Antenna Gain: Ant1: 0.54dBi;

FCC ID: 2BDI3-RUGGEDULTRA

3. Maximum Power Spectral Density**3.1 Test Result****3.1.1 PSD**

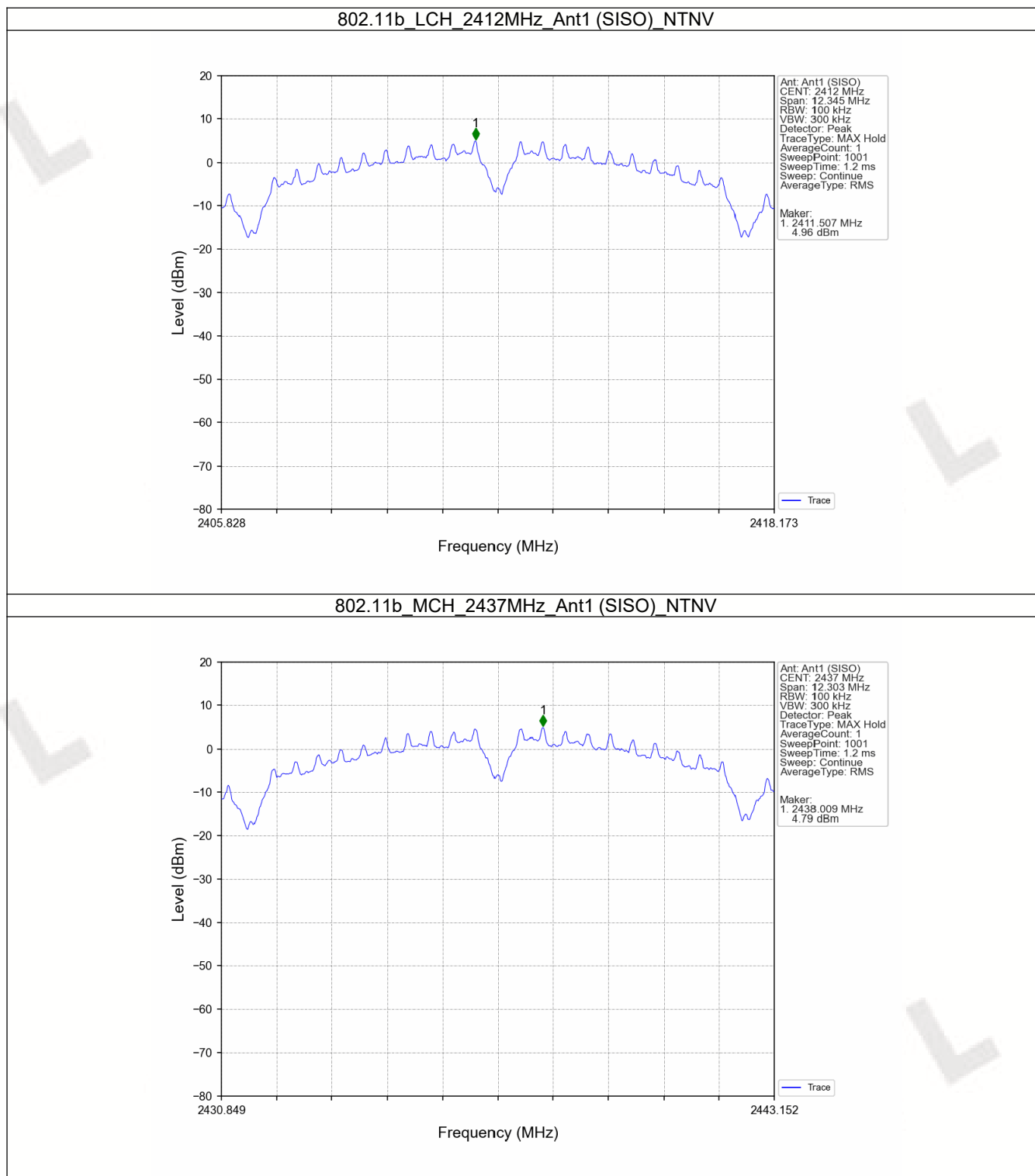
Mode	TX Type	Frequency (MHz)	Maximum PSD		Verdict
			ANT1	Limit	
802.11b	SISO	2412	4.96dBm/100KHz	<=8dBm/3KHz	Pass
		2437	4.79dBm/100KHz	<=8dBm/3KHz	Pass
		2462	4.65dBm/100KHz	<=8dBm/3KHz	Pass
802.11g	SISO	2412	-2.18dBm/100KHz	<=8dBm/3KHz	Pass
		2437	-2.64dBm/100KHz	<=8dBm/3KHz	Pass
		2462	-2.12dBm/100KHz	<=8dBm/3KHz	Pass
802.11n (HT20)	SISO	2412	-2.65dBm/100KHz	<=8dBm/3KHz	Pass
		2437	-2.11dBm/100KHz	<=8dBm/3KHz	Pass
		2462	-2.37dBm/100KHz	<=8dBm/3KHz	Pass
802.11n (HT40)	SISO	2422	-5.56dBm/100KHz	<=8dBm/3KHz	Pass
		2437	-4.66dBm/100KHz	<=8dBm/3KHz	Pass
		2452	-4.45dBm/100KHz	<=8dBm/3KHz	Pass

Note1: Antenna Gain: Ant1: 0.54dBi;

FCC ID: 2BDI3-RUGGEDULTRA

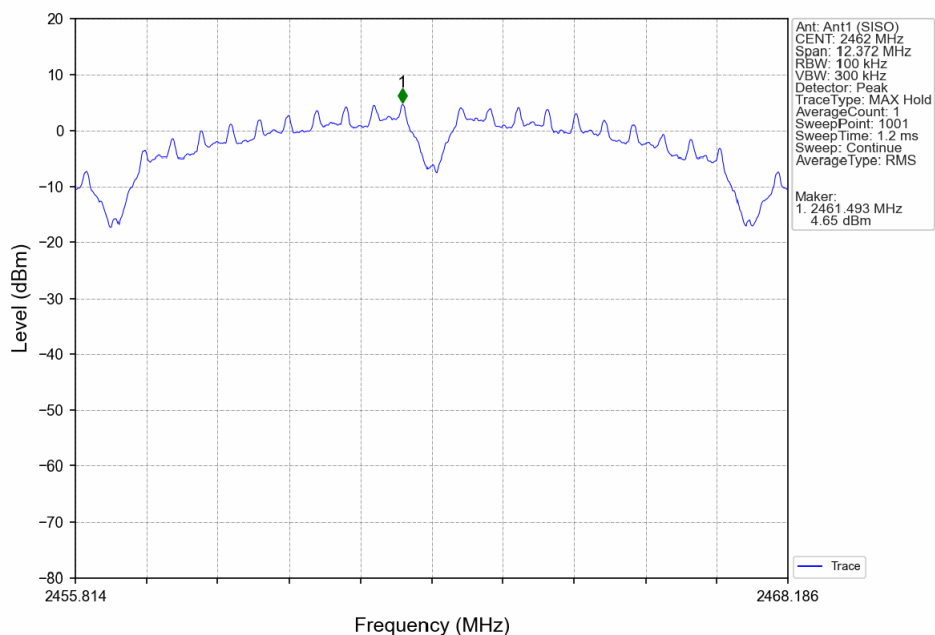
3.2 Test Graph

3.2.1 PSD

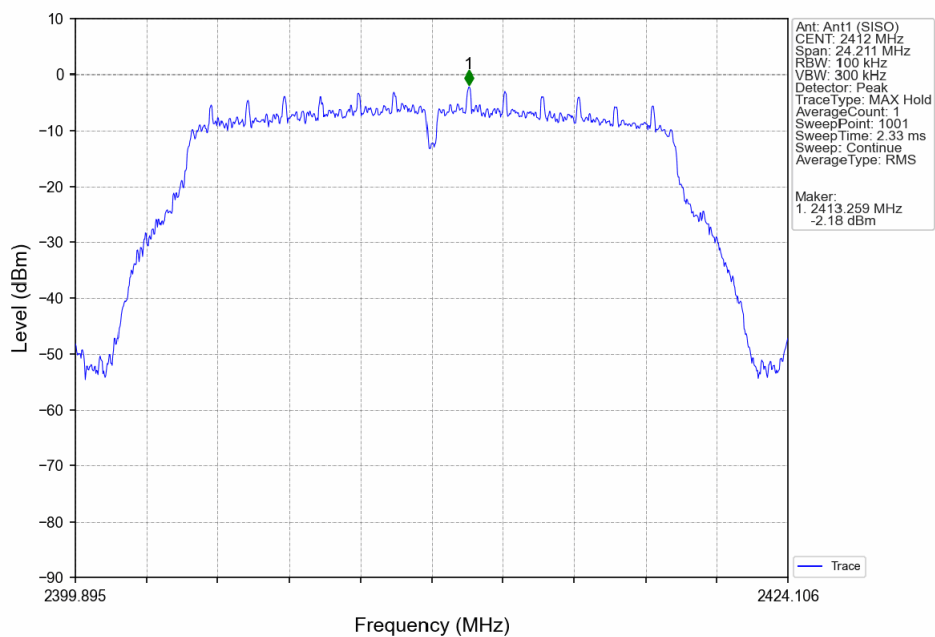


FCC ID: 2BDI3-RUGGEDULTRA

802.11b_HCH_2462MHz_Ant1 (SISO)_NTNV

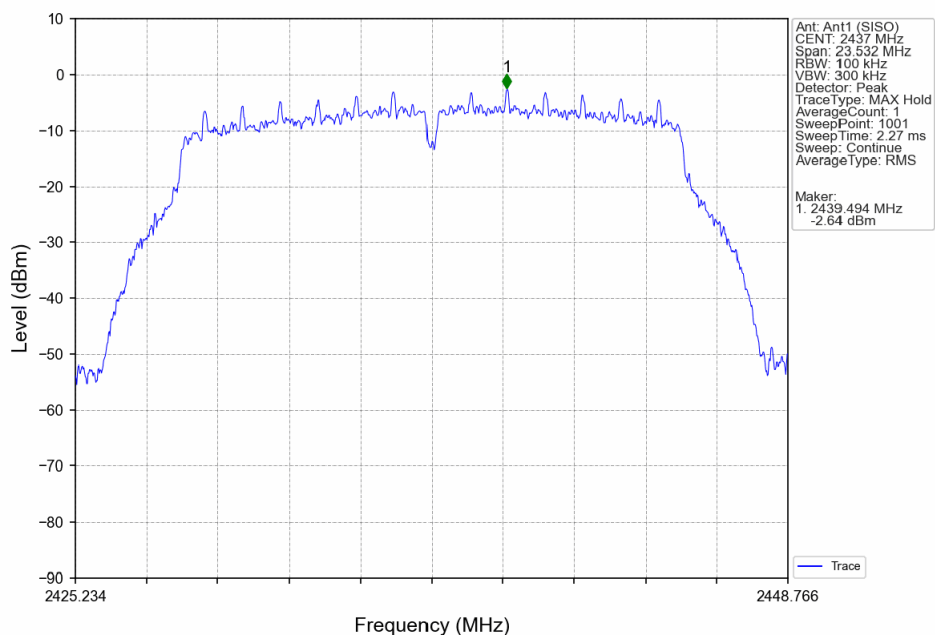


802.11g_LCH_2412MHz_Ant1 (SISO)_NTNV

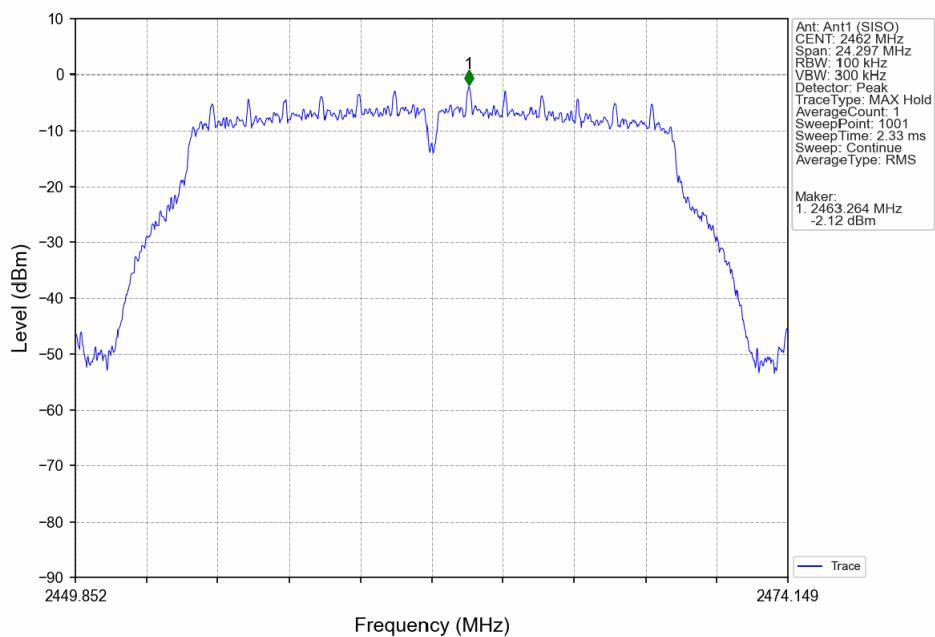


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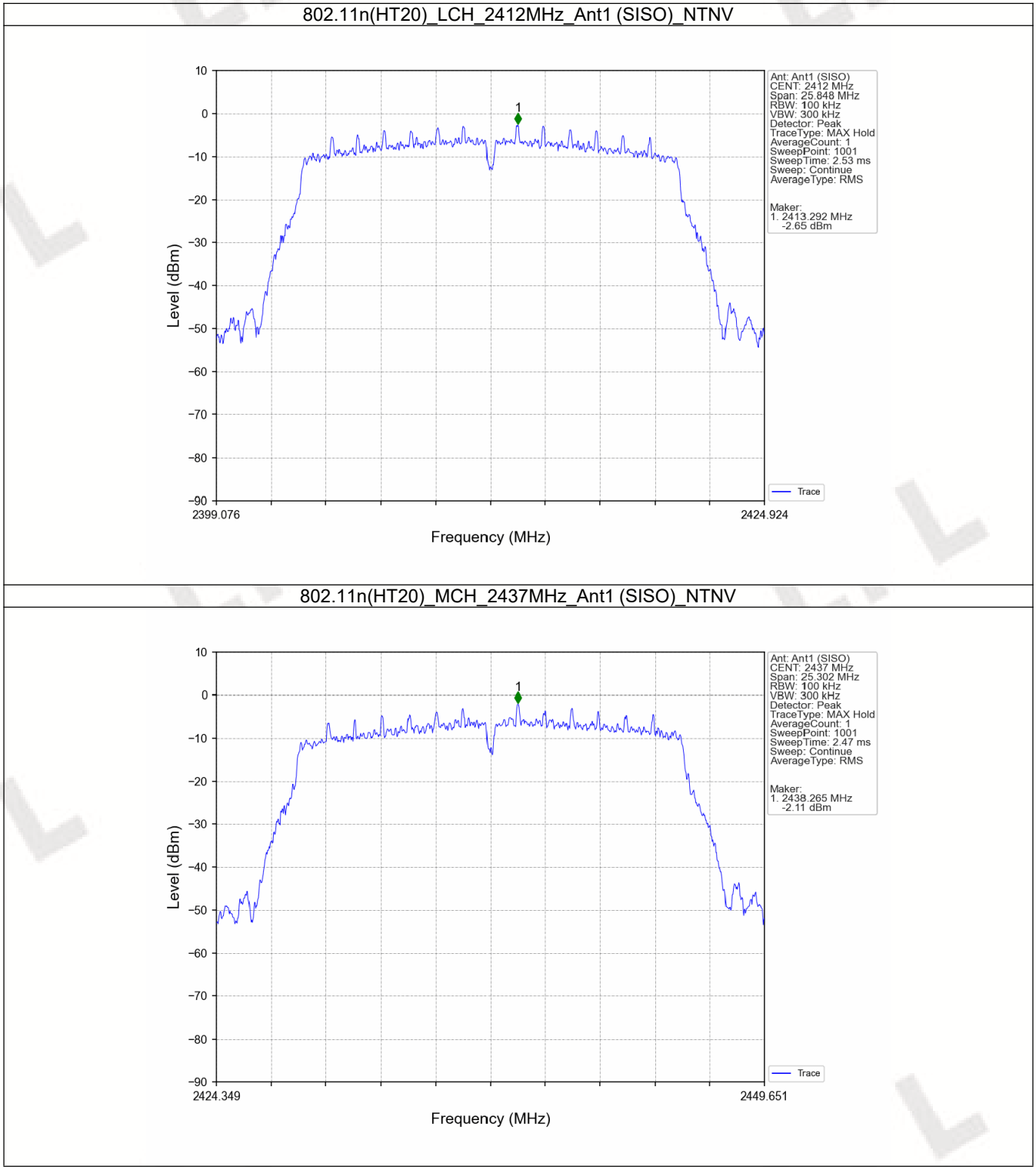
802.11g_MCH_2437MHz_Ant1 (SISO)_NTNV



802.11g_HCH_2462MHz_Ant1 (SISO)_NTNV

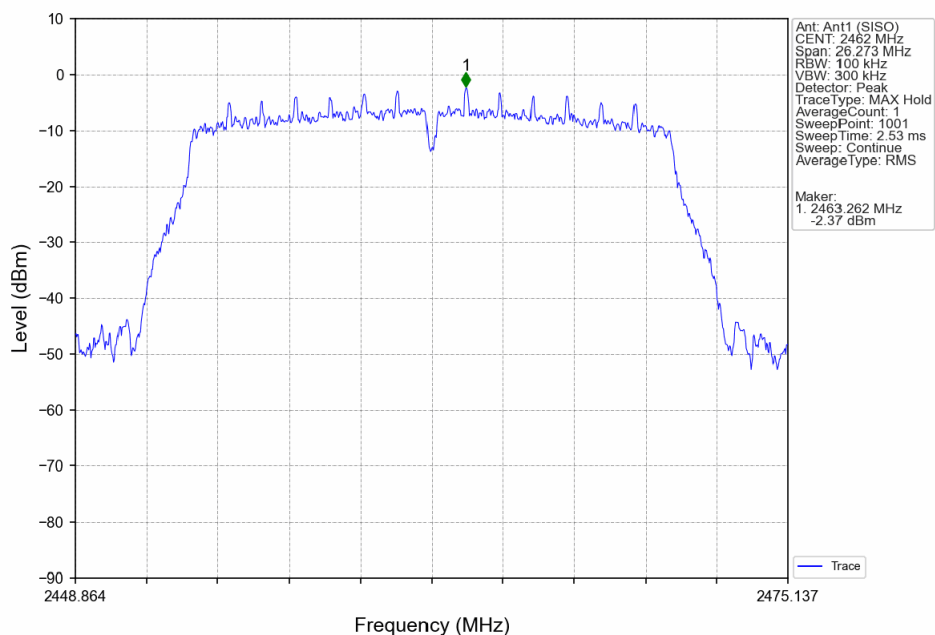


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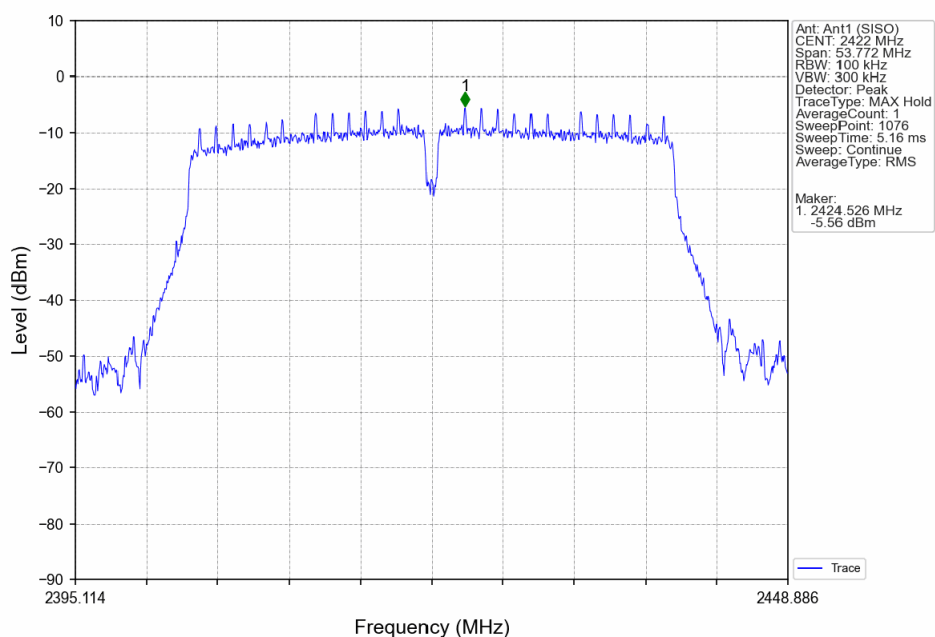


FCC ID: 2BDI3-RUGGEDULTRA

802.11n(HT20)_HCH_2462MHz_Ant1 (SISO)_NTNV

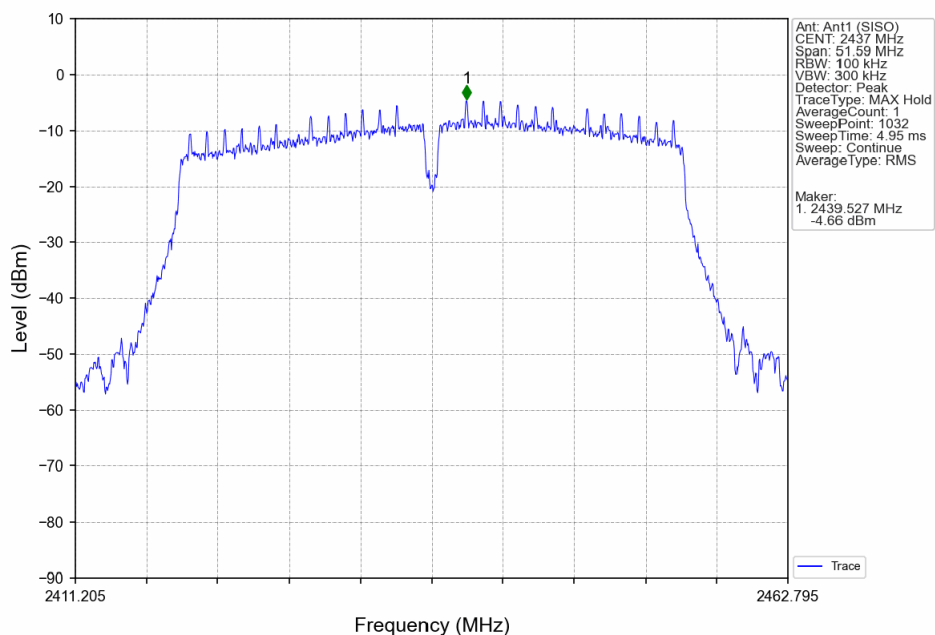


802.11n(HT40)_LCH_2422MHz_Ant1 (SISO)_NTNV

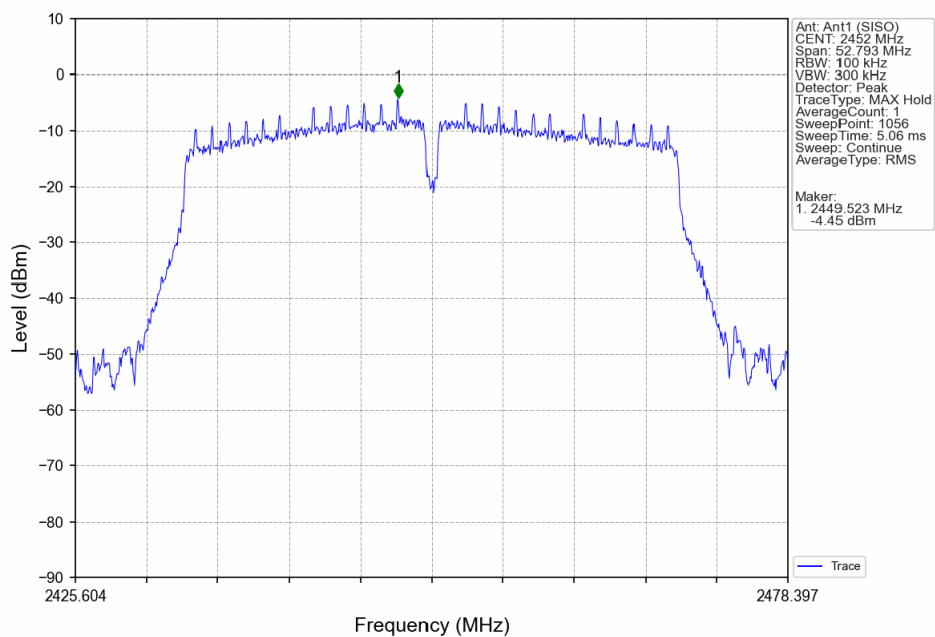


FCC ID: 2BDI3-RUGGEDULTRA

802.11n(HT40)_MCH_2437MHz_Ant1 (SISO)_NTNV



802.11n(HT40)_HCH_2452MHz_Ant1 (SISO)_NTNV



FCC ID: 2BDI3-RUGGEDULTRA

4. Unwanted Emissions In Non-restricted Frequency Bands**4.1 Test Result****4.1.1 Ref**

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
802.11b	SISO	2412	1	5.00
		2437	1	4.73
		2462	1	4.70
802.11g	SISO	2412	1	-2.29
		2437	1	-2.18
		2462	1	-2.41
802.11n (HT20)	SISO	2412	1	-2.58
		2437	1	-2.29
		2462	1	-2.40
802.11n (HT40)	SISO	2422	1	-5.61
		2437	1	-4.65
		2452	1	-4.80

Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2020, the channel contains the maximum PSD level was used to establish the reference level.

4.1.2 CSE

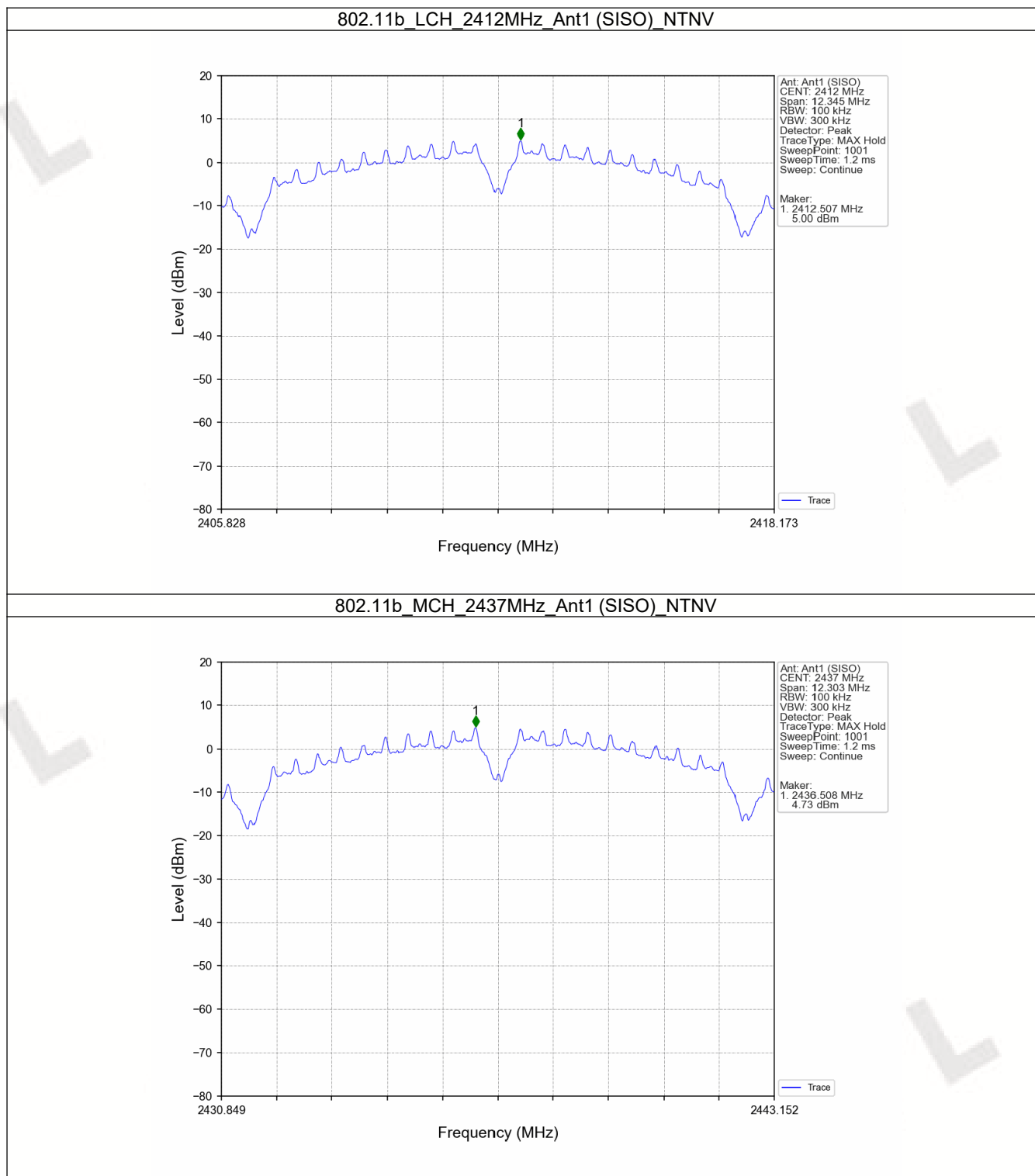
Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
802.11b	SISO	2412	1	5.00	-15.00	Pass
		2437	1	5.00	-15.00	Pass
		2462	1	5.00	-15.00	Pass
802.11g	SISO	2412	1	-2.18	-22.18	Pass
		2437	1	-2.18	-22.18	Pass
		2462	1	-2.18	-22.18	Pass
802.11n (HT20)	SISO	2412	1	-2.29	-22.29	Pass
		2437	1	-2.29	-22.29	Pass
		2462	1	-2.29	-22.29	Pass
802.11n (HT40)	SISO	2422	1	-4.65	-24.65	Pass
		2437	1	-4.65	-24.65	Pass
		2452	1	-4.65	-24.65	Pass

Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2020, the channel contains the maximum PSD level was used to establish the reference level.

FCC ID: 2BDI3-RUGGEDULTRA

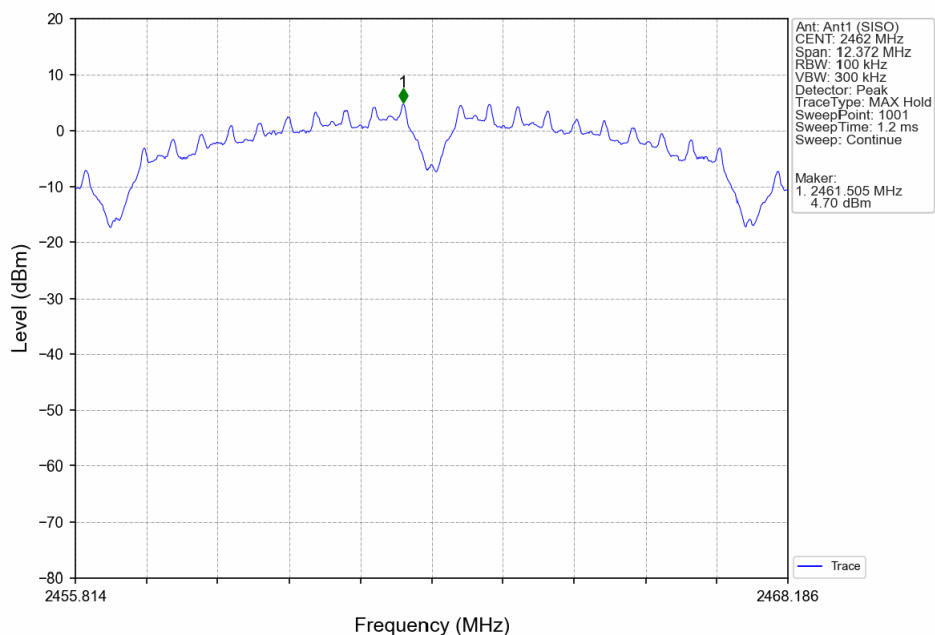
4.2 Test Graph

4.2.1 Ref

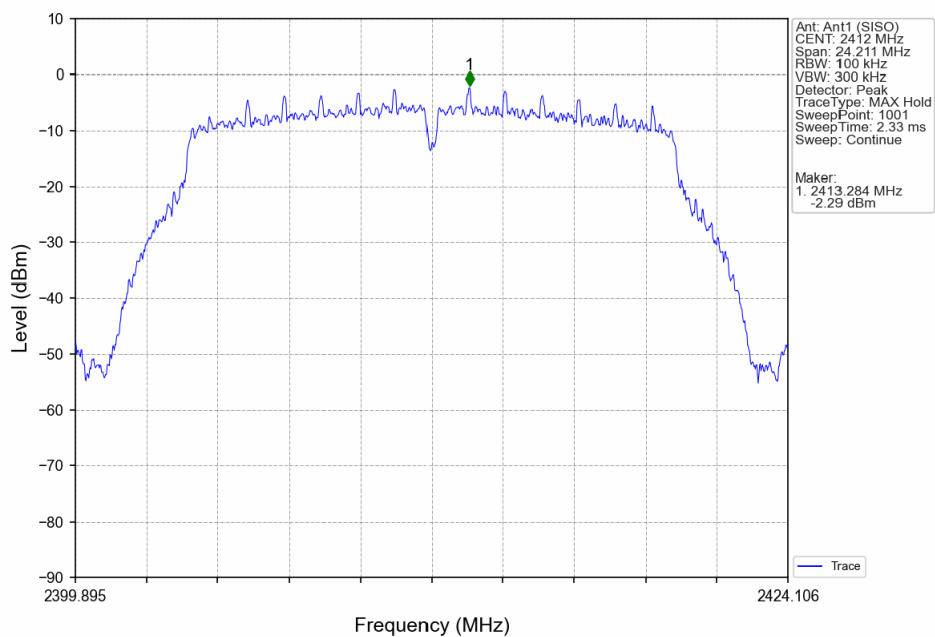


FCC ID: 2BDI3-RUGGEDULTRA

802.11b_HCH_2462MHz_Ant1 (SISO)_NTNV

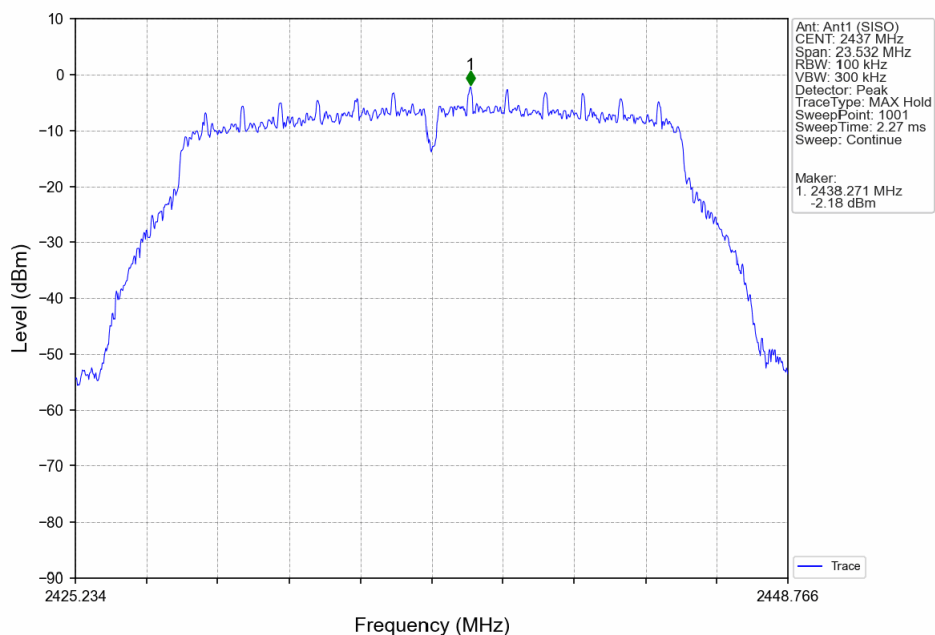


802.11g_LCH_2412MHz_Ant1 (SISO)_NTNV

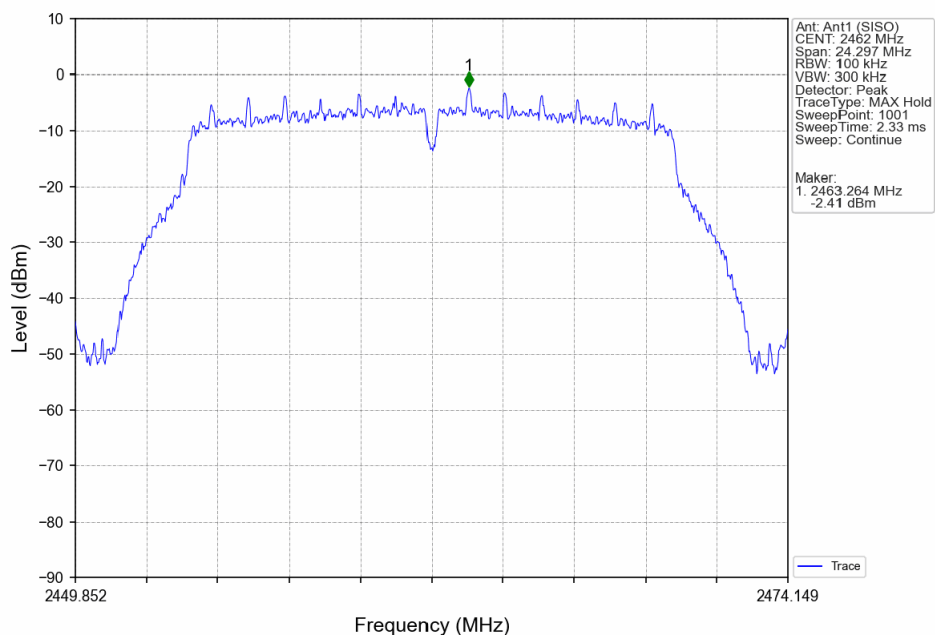


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802.11g_MCH_2437MHz_Ant1 (SISO)_NTNV

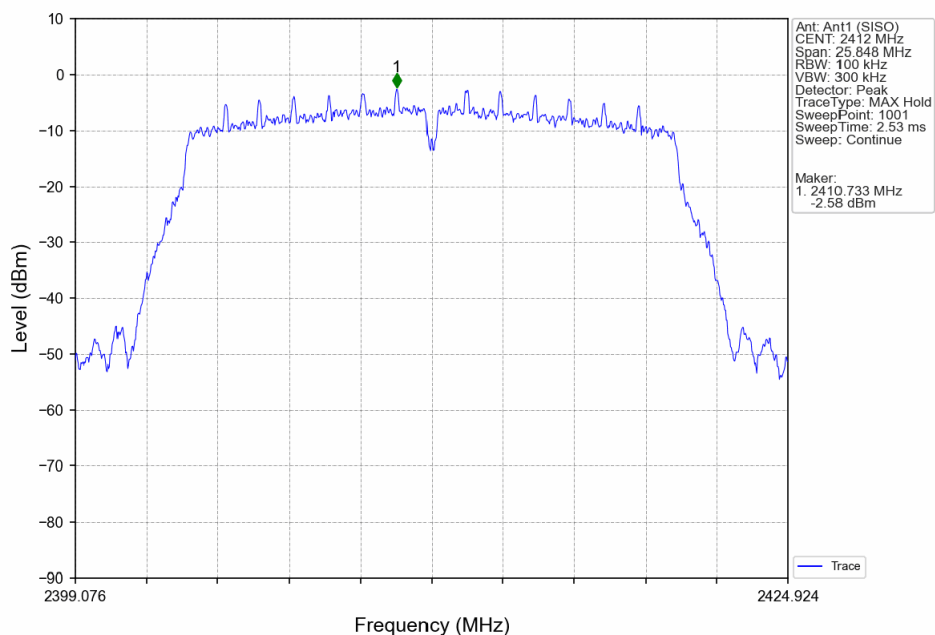


802.11g_HCH_2462MHz_Ant1 (SISO)_NTNV

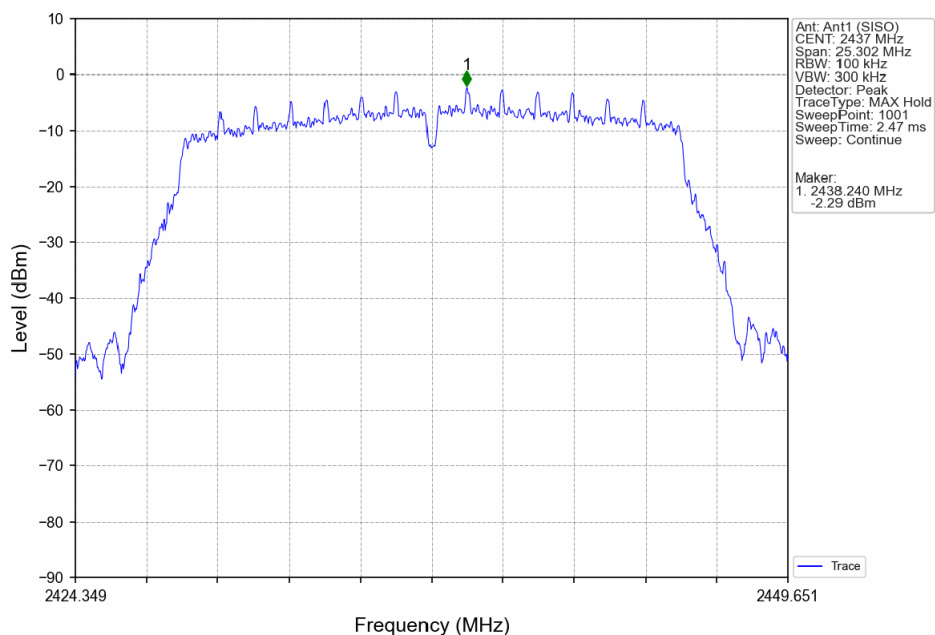


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802.11n(HT20)_LCH_2412MHz_Ant1 (SISO)_NTNV

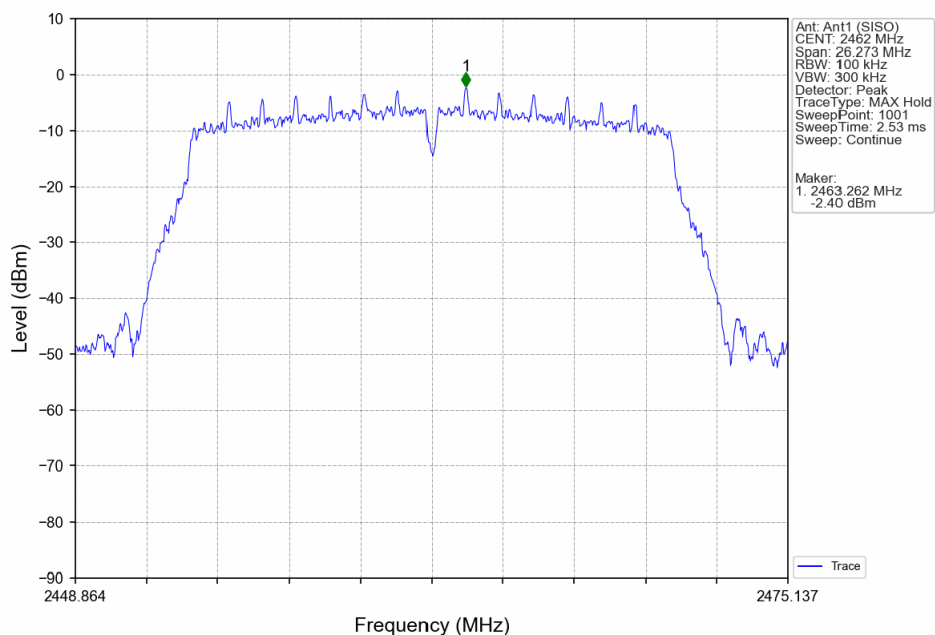


802.11n(HT20)_MCH_2437MHz_Ant1 (SISO)_NTNV

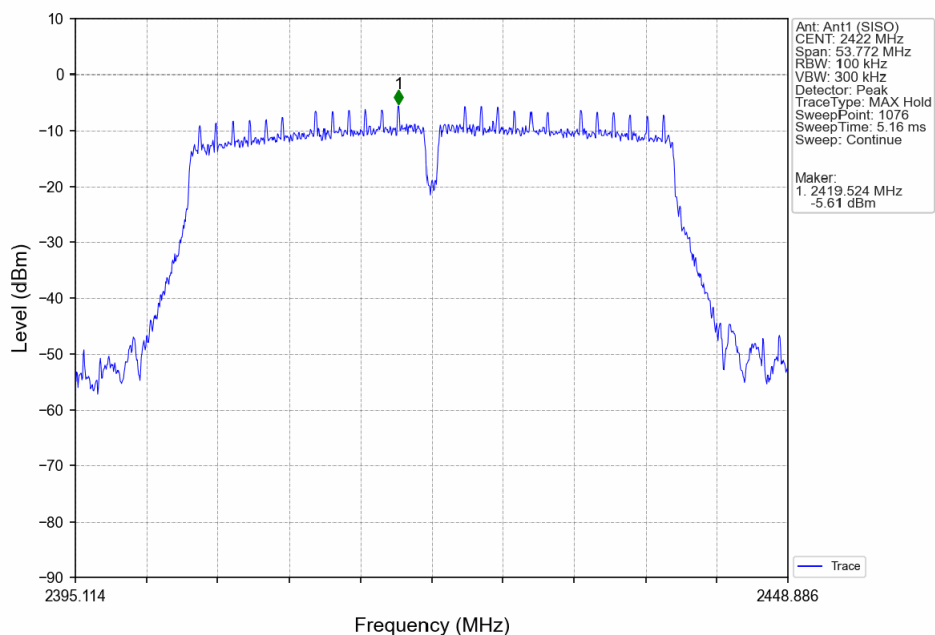


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802.11n(HT20)_HCH_2462MHz_Ant1 (SISO)_NTNV

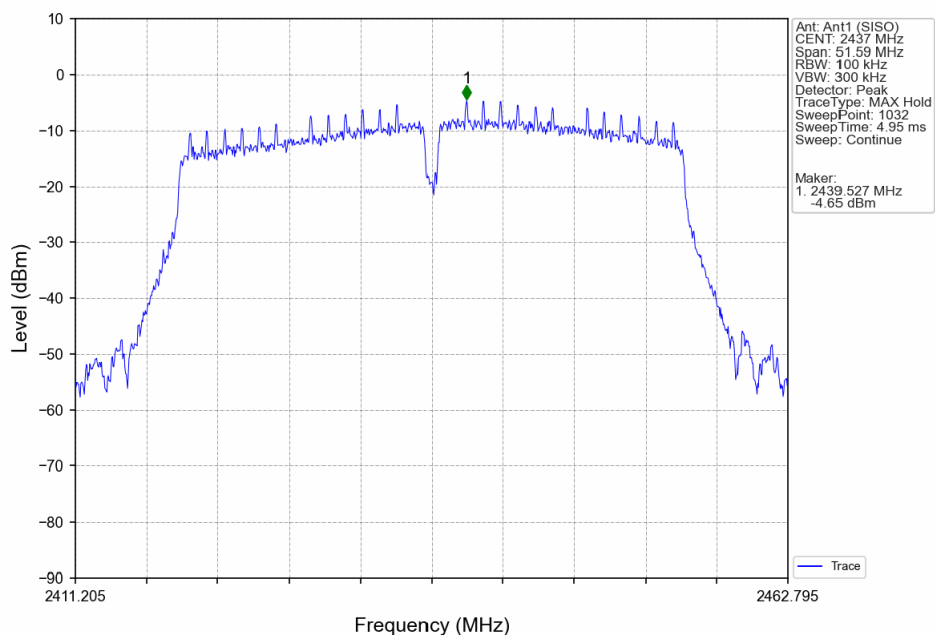


802.11n(HT40)_LCH_2422MHz_Ant1 (SISO)_NTNV

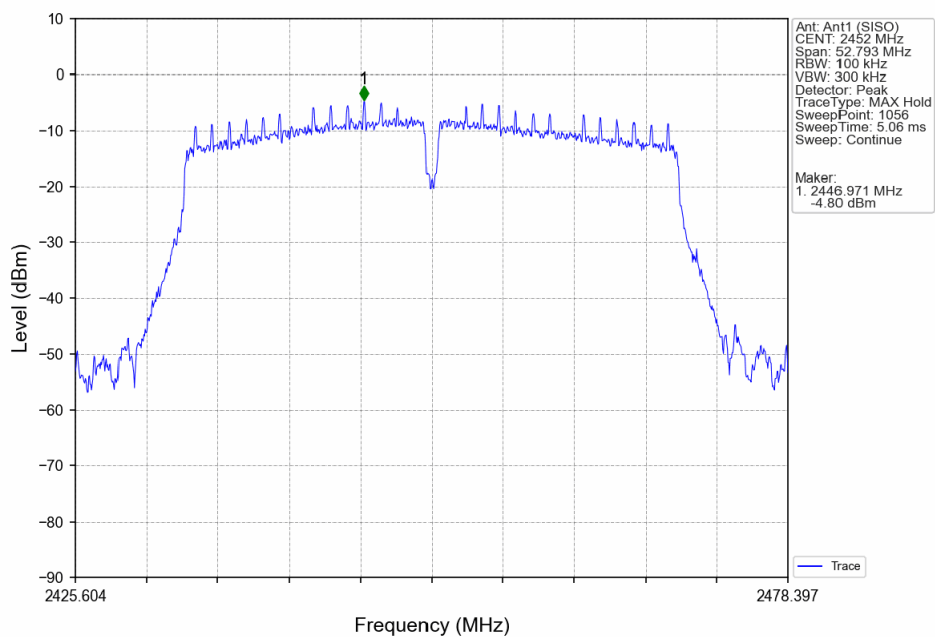


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802.11n(HT40)_MCH_2437MHz_Ant1 (SISO)_NTNV

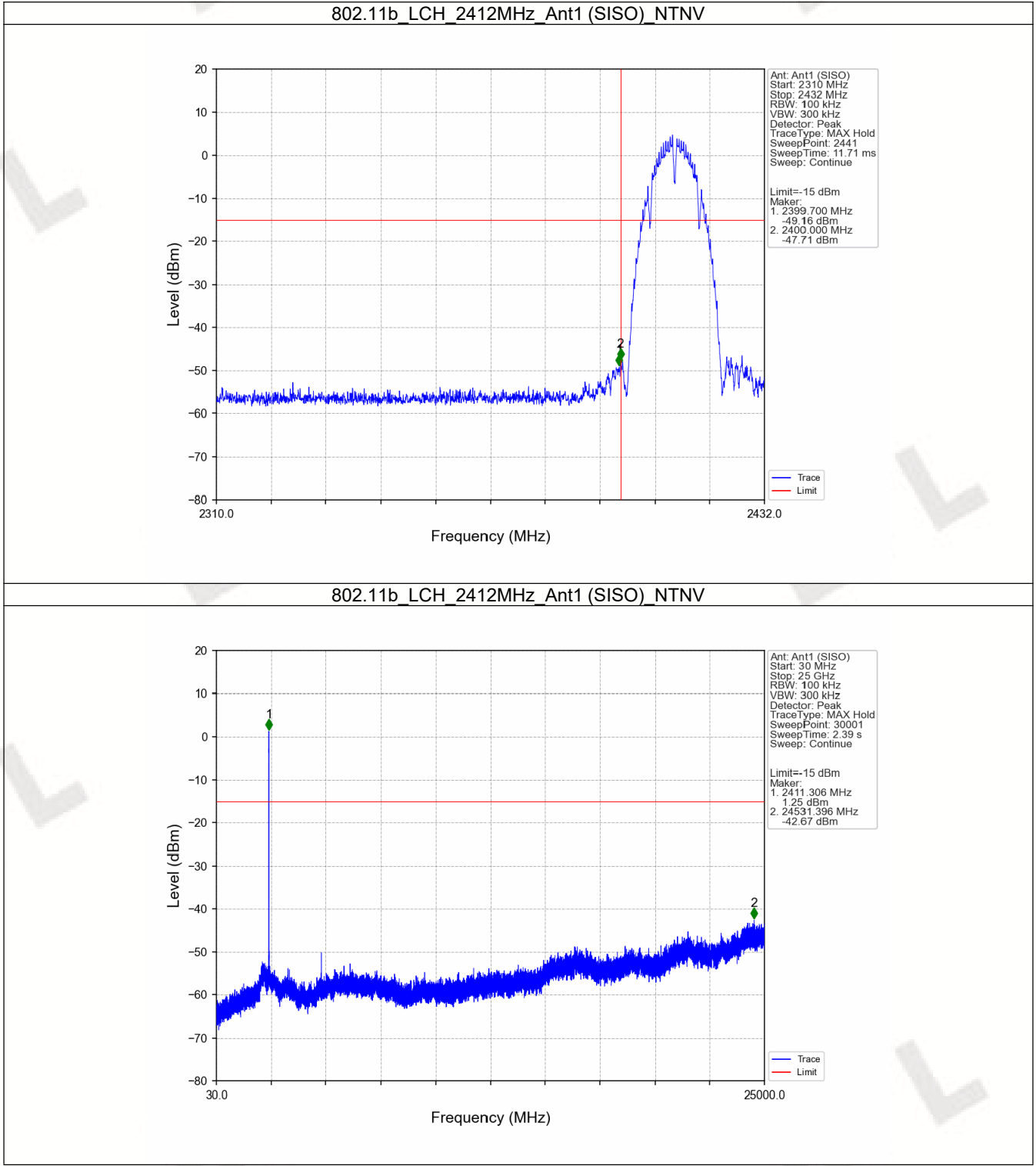


802.11n(HT40)_HCH_2452MHz_Ant1 (SISO)_NTNV

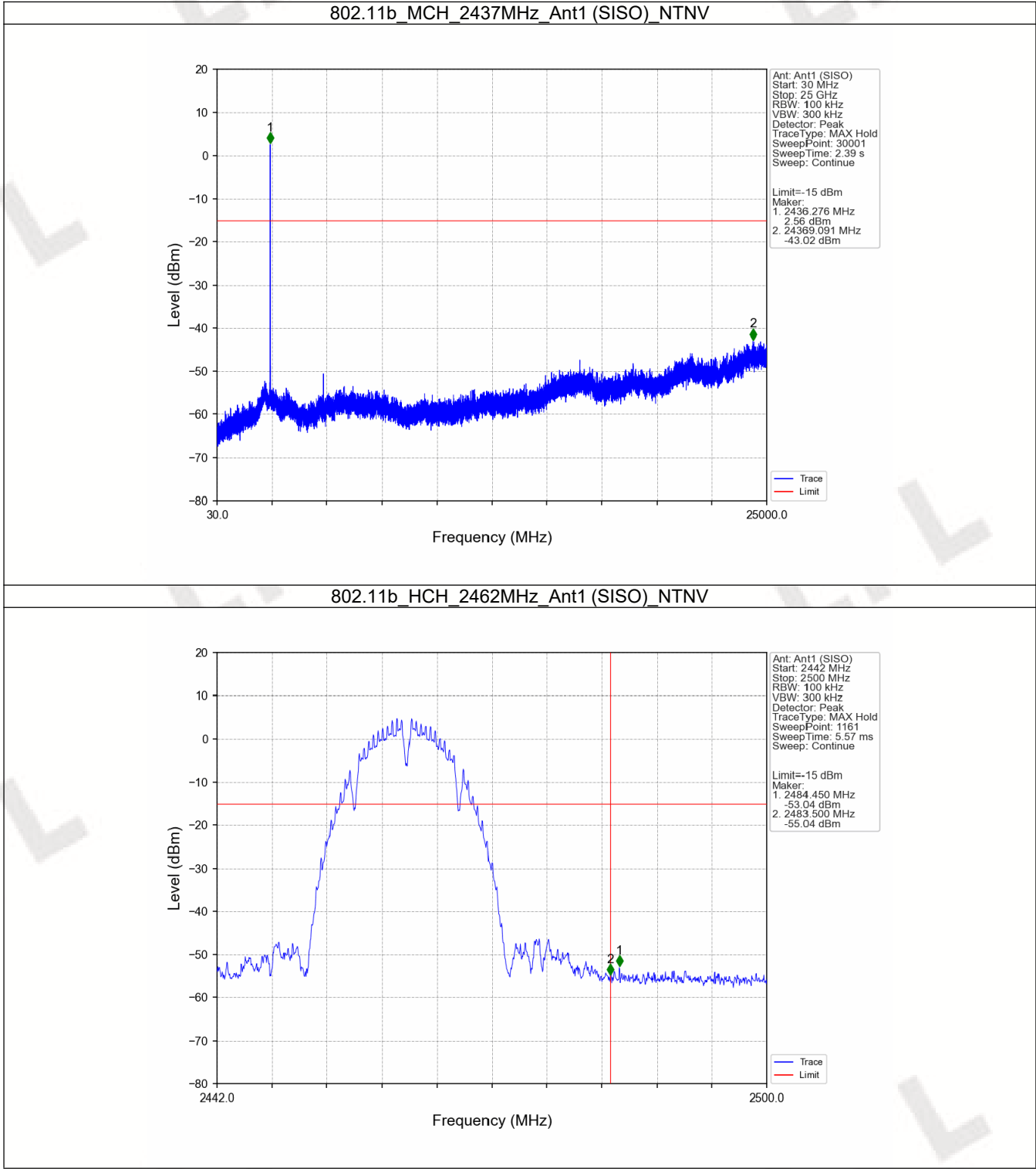


FCC ID: 2BDI3-RUGGEDULTRA

4.2.2 CSE

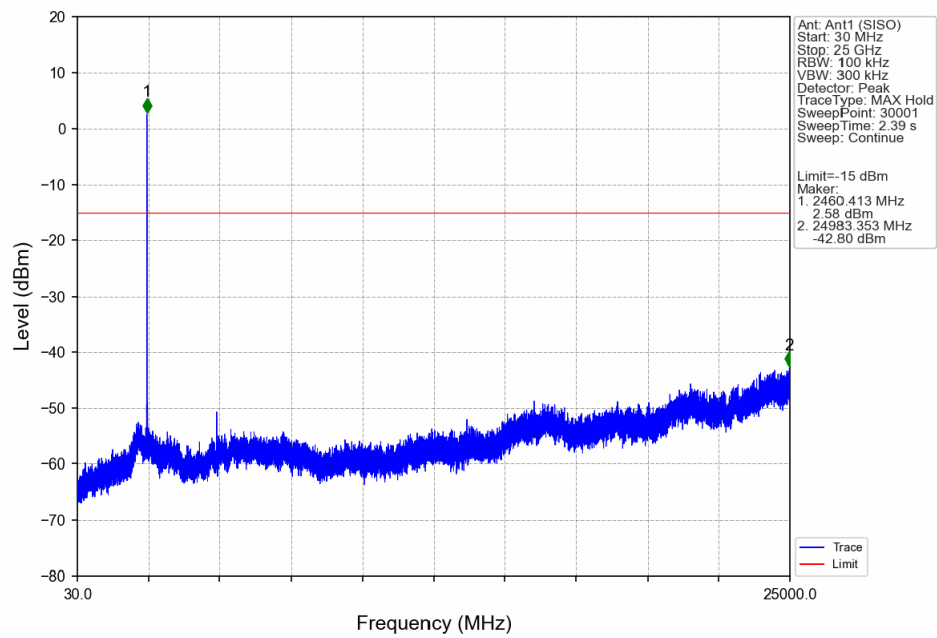


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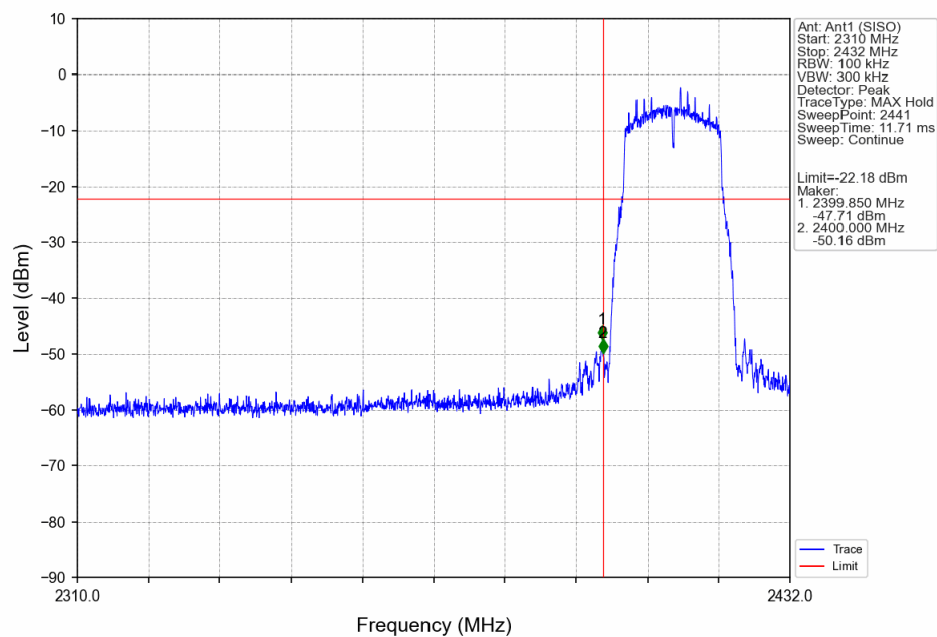


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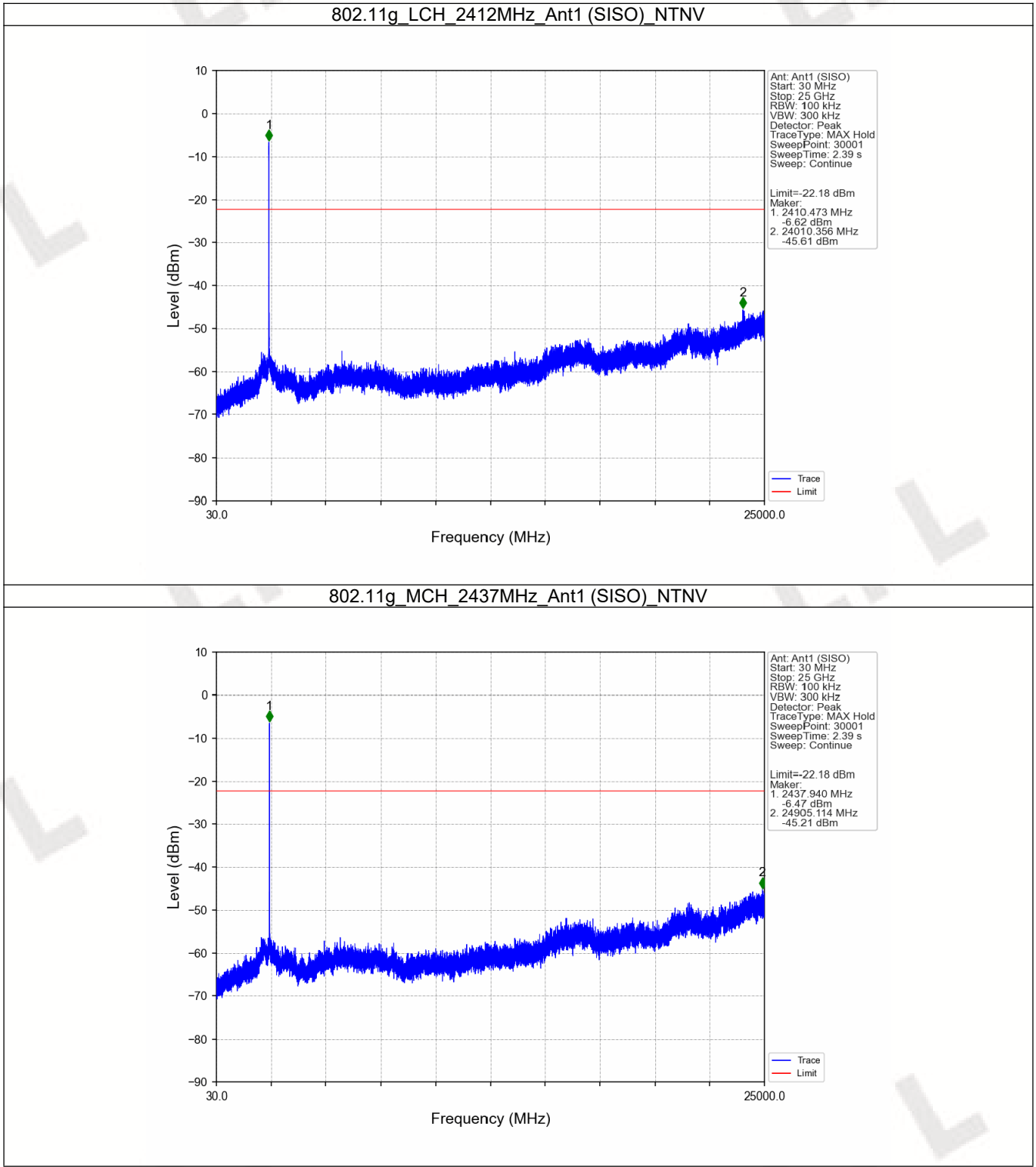
802.11b_HCH_2462MHz_Ant1 (SISO)_NTNV



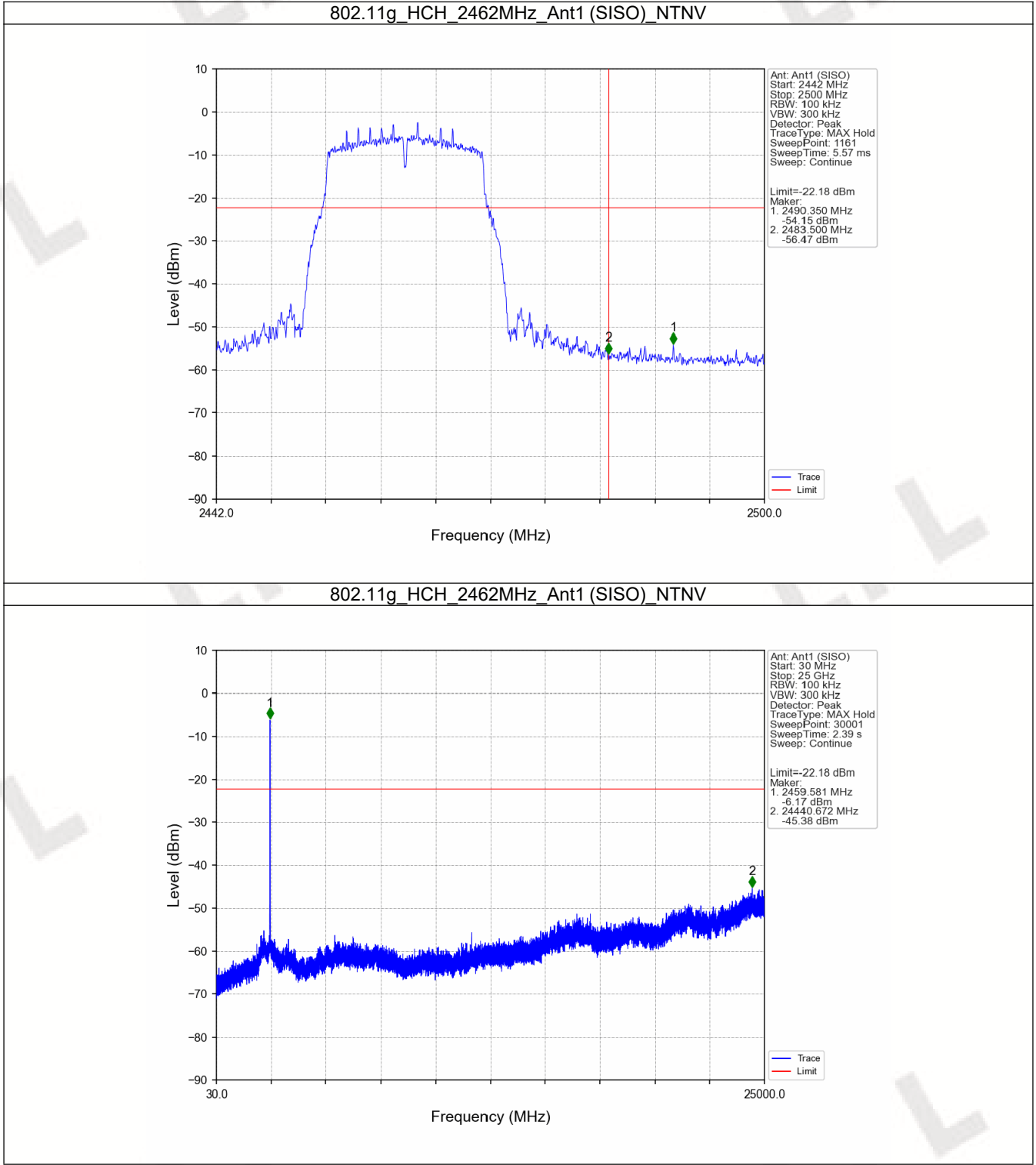
802.11g_LCH_2412MHz_Ant1 (SISO)_NTNV



FCC ID: 2BDI3-RUGGEDULTRA

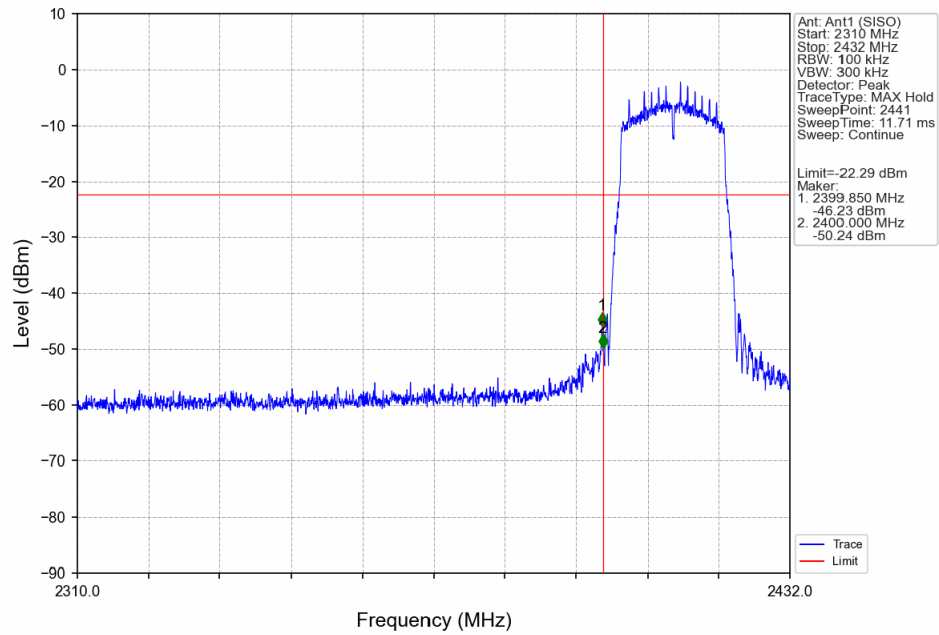


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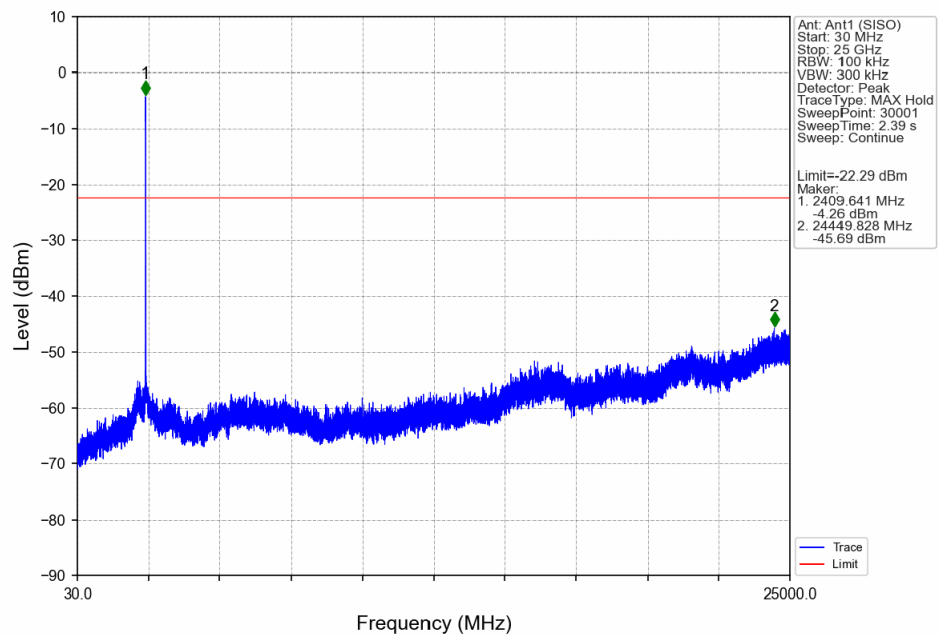


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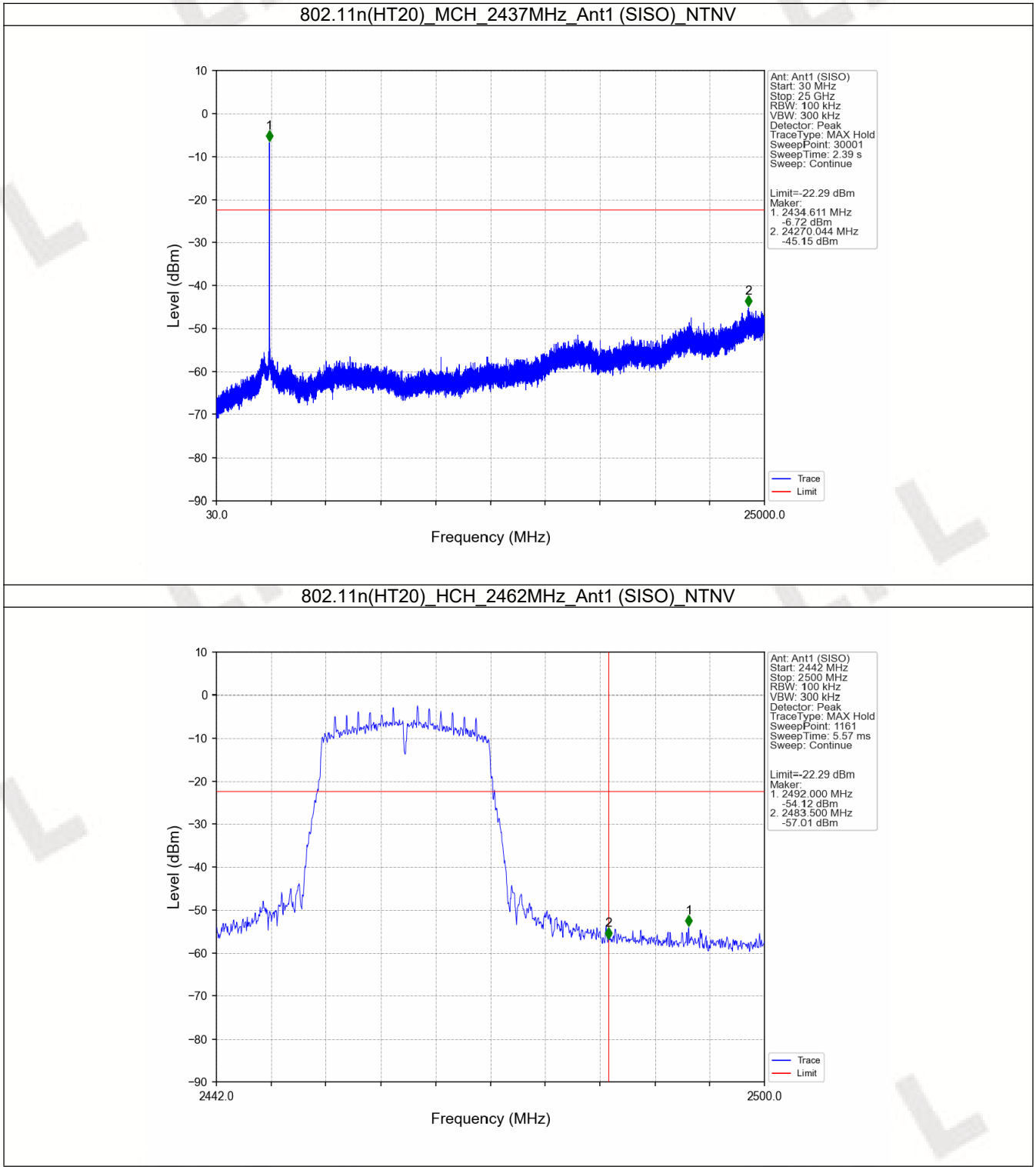
802.11n(HT20)_LCH_2412MHz_Ant1 (SISO)_NTNV



802.11n(HT20)_LCH_2412MHz_Ant1 (SISO)_NTNV

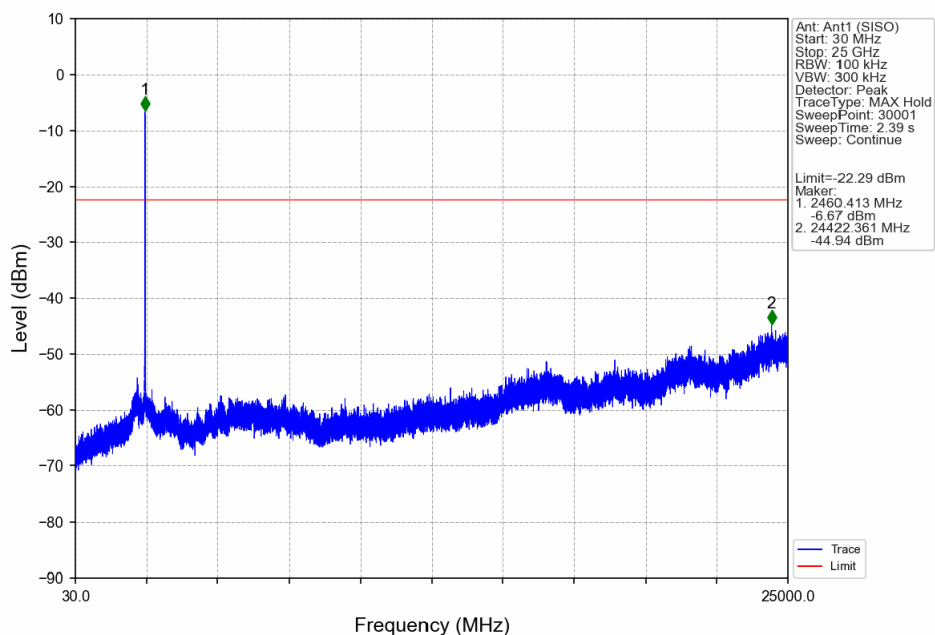


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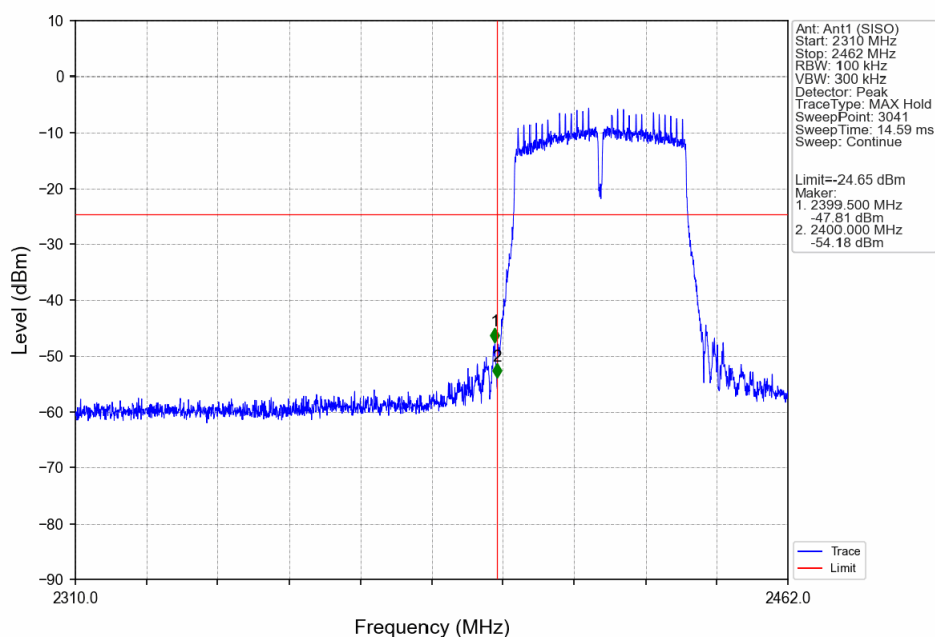


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802.11n(HT20)_HCH_2462MHz_Ant1 (SISO)_NTNV

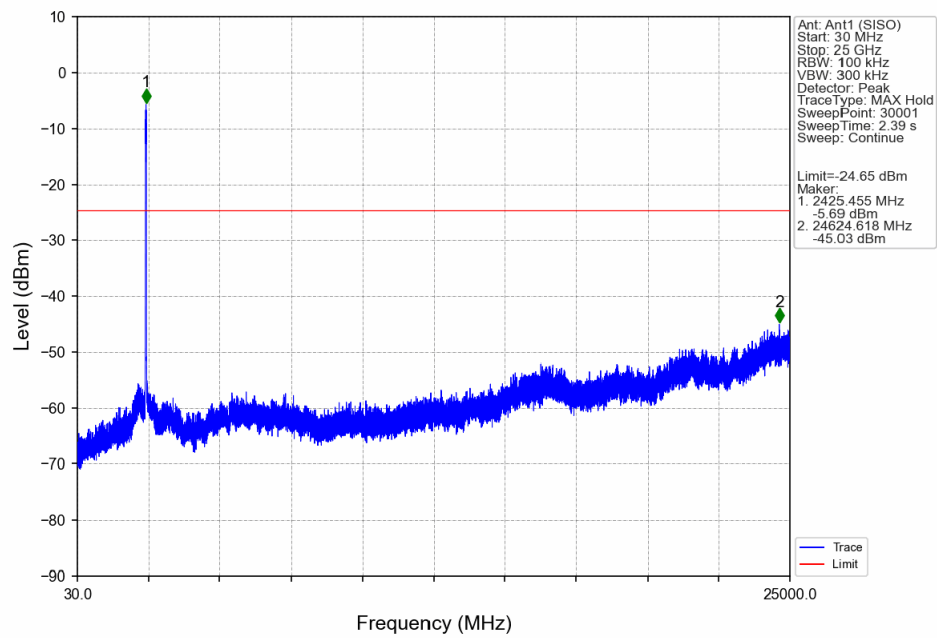


802.11n(HT40)_LCH_2422MHz_Ant1 (SISO)_NTNV

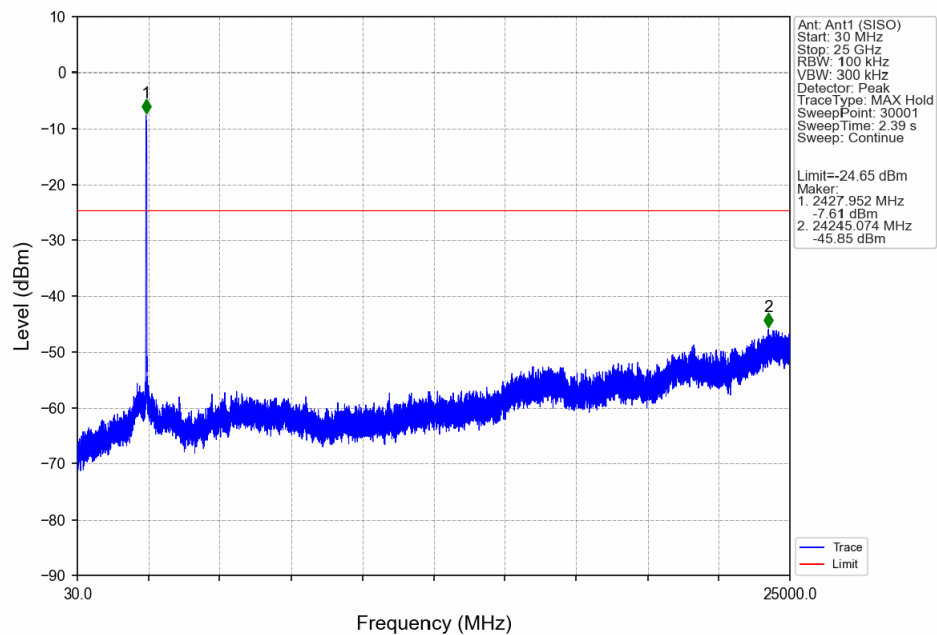


FCC ID: 2BDI3-RUGGEDULTRA

802.11n(HT40)_LCH_2422MHz_Ant1 (SISO)_NTNV



802.11n(HT40)_MCH_2437MHz_Ant1 (SISO)_NTNV



FCC ID: 2BDI3-RUGGEDULTRA

