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Issued date : 2022/1/28
FCC ID : RYK-WNFQ268AXB

RADIO TEST REPORT

Product : Wi-Fi 6E BT M.2 Module

Model Name : WNFQ-268AXI(BT)

Series Model : WNFQ-268AX(BT)

FCC ID : RYK-WNFQ268AXB

Test Regulation : FCC 47 CFR Part 15 Subpart E (Section 15.407)

Received Date : 2021/9/3

Test Date : 2021/9/6 ~ 2022/1/20

Issued Date : 2022/1/28

Applicant : SparkLAN Communications, Inc.
8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City
11493, Taiwan (R.O.C.)

Issued By : Underwriters Laboratories Taiwan Co., Ltd.
Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd.,
Zhudong Township, Hsinchu County, Taiwan



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Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

Facsimile (FAX) : +886-3-583-7948

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REVISION HISTORY

Original Test Report No.: 4790042400-US-R2-V0

[illegible]

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1. Attestation of Test Results

APPLICANT: SparkLAN Communications, Inc.
8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City 11493,
Taiwan (R.O.C.)

MANUFACTURER: SparkLAN Communications, Inc.
8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City
11493, Taiwan (R.O.C.)

EUT DESCRIPTION: Wi-Fi 6E BT M.2 Module

BRAND: SparkLAN

MODEL: WNFQ-268AXI(BT)

SERIES MODEL: WNFQ-268AX(BT)

SAMPLE STAGE: Engineering Verification Test sample

DATE of TESTED: 2021/9/6 ~ 2022/1/20

APPLICABLE STANDARDS	
STANDARD	Test Results
FCC 47 CFR PART 15 Subpart E (Section 15.407)	PASS

Underwriters Laboratories Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Prepared By:

Sally Lu
Project Handler

Date : 2022/1/28

Approved and Authorized By:

Waternil Guan
Engineer

Date : 2022/1/28

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2. Summary of Test Results

Summary of Test Results		
FCC Clause	Test Items	Result
15.407(b)(8)	AC Power Conducted Emissions	PASS
15.407(b)(5)(8)	Radiated Emissions	PASS
15.407(b)(6)	In-Band Emission (Mask)	PASS
15.407(a)(4/5/6/7/8)	Max Average Transmit Power	PASS
15.407(a)(10)	Emission Bandwidth Measurement	PASS
15.407(a)(4/5/6/7/8)	Peak Power Spectral Density	PASS
15.407 (d)(6)	Contention-based Protocol.	PASS
15.407(g)	Frequency Stability	PASS
15.407(d)(5)	Operational restrictions for 6 GHz U-NII devices	PASS
15.203	Antenna Requirement	PASS

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3. Test Methodology and Reference Procedures

The tests documented in this report were performed in accordance with 47 CFR FCC Part 2, KDB 789033 D02 General UNII Test Procedure New Rules v02r01, KDB414788 D01 Radiated Test Site v01r01, ANSI C63.10-2013, KDB 987594 D02 U-NII 6 GHz EMC Measurement v01r01 and KDB 662911 D01 Multiple Transmitter Output v02r01.

4. Facilities and Accreditation

Test Location	Underwriters Laboratories Taiwan Co., Ltd.
Address	Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Accreditation Certificate	Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398.

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5. Measurement Uncertainty

For statement of conformity, accuracy method (Section 8.2.4 and 8.2.5 of ISO Guide 98-4) was applied as decision rule for measurement in this test report.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor $k=2$.

Measurement	Frequency	Uncertainty
Conducted disturbance at mains terminals ports	150kHz ~ 30MHz	± 3.1 dB
RF Conducted	9 kHz - 40GHz	± 1.9 dB
Radiated disturbance below 30MHz	9 kHz - 30 MHz	± 1.9 dB
Radiated disturbance below 1 GHz	30MHz ~ 1GHz	± 5.4 dB
Radiated disturbance above 1 GHz	1GHz ~ 40GHz	± 4.7 dB

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6. Equipment under Test

6.1. Description of EUT

Product	Wi-Fi 6E BT M.2 Module	
Brand Name	SparkLAN	
Model Name	WNFQ-268AXI(BT)	
Series Model	WNFQ-268AX(BT)	
Operating Frequency	5.935 ~ 6.415GHz, 6.435 ~ 6.525GHz, 6.525 ~ 6.875GHz, 6.875 ~ 7.115GHz	
Modulation	1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK	
Transfer Rate	802.11a: up to 54 Mbps 802.11ax: up to MCS11	
Number of Channel	5925 ~ 6425MHz	25 for 802.11a, 802.11ax (HE20)
		12 for 802.11ax (HE40)
		6 for 802.11ax (HE80)
		3 for 802.11ax (HE160)
	6425 ~ 6525MHz	5 for 802.11a,802.11ax (HE20)
		3 for 802.11ax (HE40)
		2 for 802.11ax (HE80)
		1 for 802.11ax (HE160)
	6525 ~ 6855MHz	17 for 802.11a,802.11ax (HE20)
		8 for 802.11ax (HE40)
		3 for 802.11ax (HE80)
		1 for 802.11ax (HE160)
	6875 ~ 7125MHz	13 for 802.11a,802.11ax (HE20)
		6 for 802.11ax (HE40)
		3 for 802.11ax (HE80)
		2 for 802.11ax (HE160)

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EIRP Power	Non-Beamforming mode: 5925 ~ 6425MHz: 11.34 dBm 6425 ~ 6525MHz: 10.73 dBm 6525 ~ 6875MHz: 10.74 dBm 6875 ~ 7125MHz: 10.07 dBm Beamforming mode: 5925 ~ 6425MHz: 10.97 dBm 6425 ~ 6525MHz: 10.32 dBm 6525 ~ 6875MHz: 10.38 dBm 6875 ~ 7125MHz: 9.73 dBm
Normal Voltage	3.3 Vdc
S/N	21765J2100036
Sample ID	4158081

Note:

1. The models difference table as below:

Model	Difference
WNFQ-268AXI(BT)	WNFQ-268AXI(BT) Operating Temp -40~+75; WNFQ-268AX(BT) Operating Temp -10~+65 In addition, the sample has A-E key and E key versions. Only the golden finger is different.
WNFQ-268AX(BT)	

*Except above change, there is no change to technical construction that is included circuit diagram, PCB Layout, components and component layout, all electrical construction, and mechanical construction.

1. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

Modulation Mode	Tx,Rx Function
802.11a	2TX,2RX
802.11ax (HE20)	2TX,2RX
802.11ax (HE40)	2TX,2RX
802.11ax (HE80)	2TX,2RX
802.11ax (HE160)	2TX,2RX

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2. The EUT contains following accessory devices.

Product	Brand	Model	Description
Antenna 1	SparkLAN	AD-500AX	-
Antenna 2	SparkLAN	AD-501AX	-
Antenna 3	SparkLAN	AD-502AX	-
Antenna 4	SparkLAN	AD-503AX	-
Antenna 5	JOHANSON	2450AD18A6050	-
Antenna 6	SparkLAN	AD-504AX	-
Antenna 7	SparkLAN	AD-505AX	-

3. The above EUT information is declared by manufacturer and for more detailed features description, please refer the manufacturer's or user's manual.

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6.2. Channel List

FOR 5925 ~ 6425MHz (U-NII-5 band)

25 channels are provided for 802.11a, 802.11ax (HE20):

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
2	5935 MHz	25	6075 MHz	49	6195 MHz	73	6315 MHz
1	5955 MHz	29	6095 MHz	53	6215 MHz	77	6335 MHz
5	5975 MHz	33	6115 MHz	57	6235 MHz	81	6355 MHz
9	5995 MHz	37	6135 MHz	61	6255 MHz	85	6375 MHz
13	6015 MHz	41	6155 MHz	65	6275 MHz	89	6395 MHz
17	6035 MHz	45	6175 MHz	69	6295 MHz	93	6415 MHz
21	6055 MHz	-	-	-	-	-	-

12 channels are provided for 802.11ax (HE40):

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
3	5965 MHz	27	6085 MHz	51	6205 MHz	75	6325 MHz
11	6005 MHz	35	6125 MHz	59	6245 MHz	83	6365 MHz
19	6045 MHz	43	6165 MHz	67	6285 MHz	91	6405 MHz

6 channels are provided for 802.11ax (HE80):

Channel	Frequency	Channel	Frequency	Channel	Frequency
7	5985 MHz	39	6145 MHz	71	6305 MHz
23	6065 MHz	55	6225 MHz	87	6385 MHz

3 channels are provided for 802.11ax (HE160):

Channel	Frequency	Channel	Frequency	Channel	Frequency
15	6025 MHz	47	6185 MHz	79	6345 MHz

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FOR 6425 ~ 6525MHz (U-NII-6 band)

5 channels are provided for 802.11a, 802.11ax (HE20):

Channel	Frequency	Channel	Frequency	Channel	Frequency
97	6435 MHz	105	6475 MHz	113	6515 MHz
101	6455 MHz	109	6495 MHz	-	-

3 channels are provided for 802.11ax (HE40):

Channel	Frequency	Channel	Frequency	Channel	Frequency
99	6445 MHz	107	6485 MHz	*115	6525 MHz

2 channels are provided for 802.11ax (HE80):

Channel	Frequency	Channel	Frequency
103	6465 MHz	*119	6545 MHz

1 channel is provided for 802.11ax (HE160):

Channel	Frequency
*111	6505 MHz

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FOR 6525 ~ 6875MHz (U-NII-7 band)

17 channels are provided for 802.11a, 802.11ax (HE20):

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
117	6535 MHz	137	6635 MHz	153	6715 MHz	169	6795 MHz
121	6555 MHz	141	6655 MHz	157	6735 MHz	173	6815 MHz
125	6575 MHz	145	6675 MHz	161	6755 MHz	177	6835 MHz
129	6595 MHz	149	6695 MHz	165	6775 MHz	181	6855 MHz
133	6615 MHz	-	-	-	-	-	-

8 channels are provided for 802.11ax (HE40):

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
123	6565 MHz	139	6645 MHz	155	6725 MHz	171	6805 MHz
131	6605 MHz	147	6685 MHz	163	6765 MHz	179	6845 MHz

3 channels are provided for 802.11ax (HE80):

Channel	Frequency	Channel	Frequency	Channel	Frequency
135	6625 MHz	151	6705 MHz	167	6785 MHz

1 channel is provided for 802.11ax (HE160):

Channel	Frequency
143	6665 MHz



FOR 6875 ~ 7125MHz (U-NII-8 band):

13 channels are provided for 802.11a, 802.11ax (HE20):

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
*185	6875 MHz	201	6955 MHz	213	7015 MHz	225	7075 MHz
189	6895 MHz	205	6975 MHz	217	7035 MHz	229	7095 MHz
193	6915 MHz	209	6995 MHz	221	7055 MHz	233	7115 MHz
197	6935 MHz	-	-	-	-	-	-

6 channels are provided for 802.11ax (HE40):

Channel	Frequency	Channel	Frequency	Channel	Frequency
*187	6885 MHz	203	6965 MHz	219	7045 MHz
195	6925 MHz	211	7005 MHz	227	7085 MHz

3 channels are provided for 802.11ax (HE80):

Channel	Frequency	Channel	Frequency	Channel	Frequency
*183	6865 MHz	199	6945 MHz	215	7025 MHz

2 channels are provided for 802.11ax (HE160):

Channel	Frequency	Channel	Frequency
*175	6825 MHz	207	6985 MHz

Note: * mean this's straddle channel.



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6.3. Test Condition

Test Item	Test Site No.	Environmental Condition	Input Power	Test Date	Tested by
Antenna Port Conducted Measurement	SR4	23~26°C/ 60~65%RH	3.3Vdc	2021/09/06~ 2022/1/20	Mike Cai
Radiated Spurious Emission	966-2	23~26°C/ 60~65%RH	3.3Vdc	2021/09/06~ 2021/11/10	Mike Cai
AC power Line Conducted Emission	SR1	23~26°C/ 60~65%RH	3.3Vdc	2021/09/16~ 2021/11/10	Mike Cai

FCC Test Firm Registration Number: 498077

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6.4. Description of Available Antennas

Ant. No.	Transmitter Circuit	Brand Name	Model Name	Ant. Type	Frequency Band (MHz)	Maximum Gain (dBi)	Remark
1	Chain (0)+(1)	SparkLAN	AD-500AX	Dipole	2400~2483	2.65	RP-SMA
					5150~5250	4.35	
					5250~5350	4.35	
					5470~5725	4.35	
					5725~5850	4.81	
					5925~6425	4.98	
					6425~6525	4.85	
					6525~6875	4.79	
2	Chain (0)+(1)	SparkLAN	AD-501AX	Dipole	6875~7125	4.82	RP-SMA
					2400~2483	3.7	
					5150~5850	5	
3	Chain (0)+(1)	SparkLAN	AD-502AX	PIFA	5925~7125	5	IPEX
					2400~2483	3.5	
					5150~5850	5	
4	Chain (0)+(1)	SparkLAN	AD-503AX	Dipole	5925~7125	3.9	RP-SMA
					2400~2483	3.7	
					5150~5850	5	
5	Chain (0)+(1)	JOHANSON	2450AD18A6050	CHIP	5925~7125	5	NA
					2400~2483	2	
					5150~5850	1.5	
6	Chain (0)+(1)	SparkLAN	AD-504AX	Dipole	5925~7125	2.7	I-PEX
					2400~2483	2.67	
					5150~5250	4.35	
					5250~5350	3.83	
					5470~5725	4.7	
					5725~5850	4.87	
					5925~6425	4.91	
					6425~6525	4.85	
7	Chain (0)+(1)	SparkLAN	AD-505AX	Dipole	6525~6875	4.94	I-PEX
					6875~7125	4.94	
					2400~2483	2.67	
					5150~5250	4.35	
					5250~5350	3.83	
					5470~5725	4.7	
					5725~5850	4.87	
					5925~6425	4.91	

Note: The above antenna information was provided from customer and for more detailed features description, please refer the manufacturer's specification or user's manual.

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6.5. Test Mode Applicability and Tested Channel Detail

- The fundamental of the dipole antenna was investigated in two orthogonal (lay and stand), it was determined that stand mode was worst-case. Therefore, all final radiated testing was performed with the dipole antenna in stand mode.
- For AC power line conducted emissions, the pre-scan has been determined by AC power 120Vac/60Hz (worst case)
- The antennas AD-501AX, AD-503AX has the highest gain, the following conducted tests are all carried out using this antenna gain.
- For radiated tests, following Radiated versus Conducted Measurements Guidance, radiated emissions measurements test was done with 50ohm terminator on antenna port
- For Antenna Port Conducted Measurement, this item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.
- For below 1 GHz radiated emission and AC power line conducted emission have performed all modes of operation were investigated and the worst-case emissions are reported.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).



Non-Beamforming mode:

Test Item	Mode	Modulation Technology	Modulation Type	Available Channel	Test Channel	Data Rate
Radiated Emissions (Above 1GHz)	802.11a	5955-6415	OFDM	1 to 93	2, 1, 45, 93	6Mbps
	802.11ax20		OFDMA	1 to 93	2, 1, 45, 93	HE0
	802.11ax40			3 to 91	3, 43, 91	HE0
	802.11ax80			7 to 87	7, 39, 87	HE0
	802.11ax160			15 to 79	15,47,79	HE0
	802.11a	6435-6515	OFDM	97 to 113	97, 105, 113	6Mbps
	802.11ax20		OFDMA	97 to 113	97, 105, 113	HE0
	802.11ax40			99 to 115	99, 107, 115	HE0
	802.11ax80			103 to 119	103, 119	HE0
	802.11ax160			111	111	HE0
	802.11a	6535-6875	OFDM	117 to 181	117, 149, 181	6Mbps
	802.11ax20		OFDMA	117 to 181	117, 149, 181	HE0
	802.11ax40			123 to 179	123, 155, 179	HE0
	802.11ax80			135 to 167	135, 151, 167	HE0
	802.11ax160			143	143	HE0
	802.11a	6875-7115	OFDM	185 to 233	185, 209, 229, 233	6Mbps
	802.11ax20		OFDMA	185 to 233	185, 209, 229, 233	HE0
	802.11ax40			187 to 227	187, 211, 227	HE0
	802.11ax80			183 to 215	183, 199, 215	HE0
	802.11ax160			175 to 207	175, 207	HE0
Radiated Emissions (Below 1GHz)	802.11a	6875-7115	OFDM	185 to 233	233	HE0
AC Power Line Conducted Emission	802.11a	6875-7115	OFDM	185 to 233	233	HE0
Antenna Port Conducted Measurement	802.11a	5955-6415	OFDM	1 to 93	2, 1, 45, 93	6Mbps
	802.11ax20		OFDMA	1 to 93	2, 1, 45, 93	HE0
	802.11ax40			3 to 91	3, 43, 91	HE0
	802.11ax80			7 to 87	7, 39, 87	HE0
	802.11ax160			15 to 79	15,47,79	HE0
	802.11a	6435-6515	OFDM	97 to 113	97, 105, 113	6Mbps
	802.11ax20		OFDMA	97 to 113	97, 105, 113	HE0
	802.11ax40			99 to 115	99, 107, 115	HE0
	802.11ax80			103 to 119	103, 119	HE0
	802.11ax160			111	111	HE0
	802.11a	6535-6875	OFDM	117 to 181	117, 149, 181	6Mbps
	802.11ax20		OFDMA	117 to 181	117, 149, 181	HE0
	802.11ax40			123 to 179	123, 155, 179	HE0
	802.11ax80			135 to 167	135, 151, 167	HE0
	802.11ax160			143	143	HE0
	802.11a	6875-7115	OFDM	185 to 233	185, 209, 229, 233	6Mbps
	802.11ax20		OFDMA	185 to 233	185, 209, 229, 233	HE0
	802.11ax40			187 to 227	187, 211, 227	HE0
	802.11ax80			183 to 215	183, 199, 215	HE0
	802.11ax160			175 to 207	175, 207	HE0

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Test Item	Mode	Modulation Technology	Modulation Type	Available Channel	Test Channel	Data Rate
Contention Based Protocol Measurement	802.11ax20	5955-6415	OFDMA	1 to 93	1	HE0
	802.11ax160			45	45	HE0
	802.11ax20	6435-6515	OFDMA	97 to 113	97	HE0
	802.11ax160			109	109	HE0
	802.11ax20	6535-6875	OFDMA	117 to 181	153	HE0
	802.11ax160			141	141	HE0
	802.11ax20	6875-7115	OFDMA	185 to 233	213	HE0
	802.11ax160			205	205	HE0
Conducted Emissions (Above 1GHz)	802.11a	5955-6415	OFDM	1 to 93	2, 1, 45, 93	6Mbps
	802.11ax20		OFDMA	1 to 93	2, 1, 45, 93	HE0
	802.11ax40			3 to 91	3, 43, 91	HE0
	802.11ax80			7 to 87	7, 39, 87	HE0
	802.11ax160			15 to 79	15, 47, 79	HE0
	802.11a	6435-6515	OFDM	97 to 113	97, 105, 113	6Mbps
	802.11ax20		OFDMA	97 to 113	97, 105, 113	HE0
	802.11ax40			99 to 115	99, 107, 115	HE0
	802.11ax80			103 to 119	103, 119	HE0
	802.11ax160			111	111	HE0
	802.11a	6535-6875	OFDM	117 to 181	117, 149, 181	6Mbps
	802.11ax20		OFDMA	117 to 181	117, 149, 181	HE0
	802.11ax40			123 to 179	123, 155, 179	HE0
	802.11ax80			135 to 167	135, 151, 167	HE0
	802.11ax160			143	143	HE0
	802.11a	6875-7115	OFDM	185 to 233	185, 209, 229, 233	6Mbps
	802.11ax20		OFDMA	185 to 233	185, 209, 229, 233	HE0
	802.11ax40			187 to 227	187, 211, 227	HE0
	802.11ax80			183 to 215	183, 199, 215	HE0
	802.11ax160			175 to 207	175, 207	HE0
Conducted Emissions (Below 1GHz)	802.11a	6875-7115	OFDM	185 to 233	215	HE0

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Beamforming mode:

Test Item	Mode	Modulation Technology	Modulation Type	Available Channel	Test Channel	Data Rate
Antenna Port Conducted Measurement	802.11ax20	5955-6415	OFDMA	1 to 93	2, 1, 45, 93	HE0
	802.11ax40			3 to 91	3, 43, 91	HE0
	802.11ax80			7 to 87	7, 39, 87	HE0
	802.11ax160			15 to 79	15,47,79	HE0
	802.11ax20	6435-6515	OFDMA	97 to 113	97, 105, 113	HE0
	802.11ax40			99 to 115	99, 107, 115	HE0
	802.11ax80			103 to 119	103, 119	HE0
	802.11ax160			111	111	HE0
	802.11ax20	6535-6875	OFDMA	117 to 181	117, 149, 181	HE0
	802.11ax40			123 to 179	123, 155, 179	HE0
	802.11ax80			135 to 167	135, 151, 167	HE0
	802.11ax160			143	143	HE0
	802.11ax20	6875-7115	OFDMA	185 to 233	185, 209, 229, 233	HE0
	802.11ax40			187 to 227	187, 211, 227	HE0
	802.11ax80			183 to 215	183, 199, 215	HE0
	802.11ax160			175 to 207	175,207	HE0

*Note: The worse spurious emissions test and maximum output power was found in Non-Beamforming mode. Therefore Beamforming mode only the test data of the RF output power were recorded in this report.

Simultaneously transmission condition:

Condition	Technology	
1	WLAN (2.4GHz)	WLAN (6GHz)
2	BT-GFSK	WLAN (6GHz)

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

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6.6. Duty cycle

Mode	On Time(ms)	On+Off Time(ms)	Duty Cycle	Duty Factor(dB)
802.11a	1.95	1.985	0.982	N/A
802.11ax(HE20)	5.33	5.35	0.996	N/A
802.11ax(HE40)	4.748	4.83	0.983	N/A
802.11ax(HE80)	2.515	2.57	0.979	0.094
802.11ax(HE160)	2.195	2.225	0.987	N/A

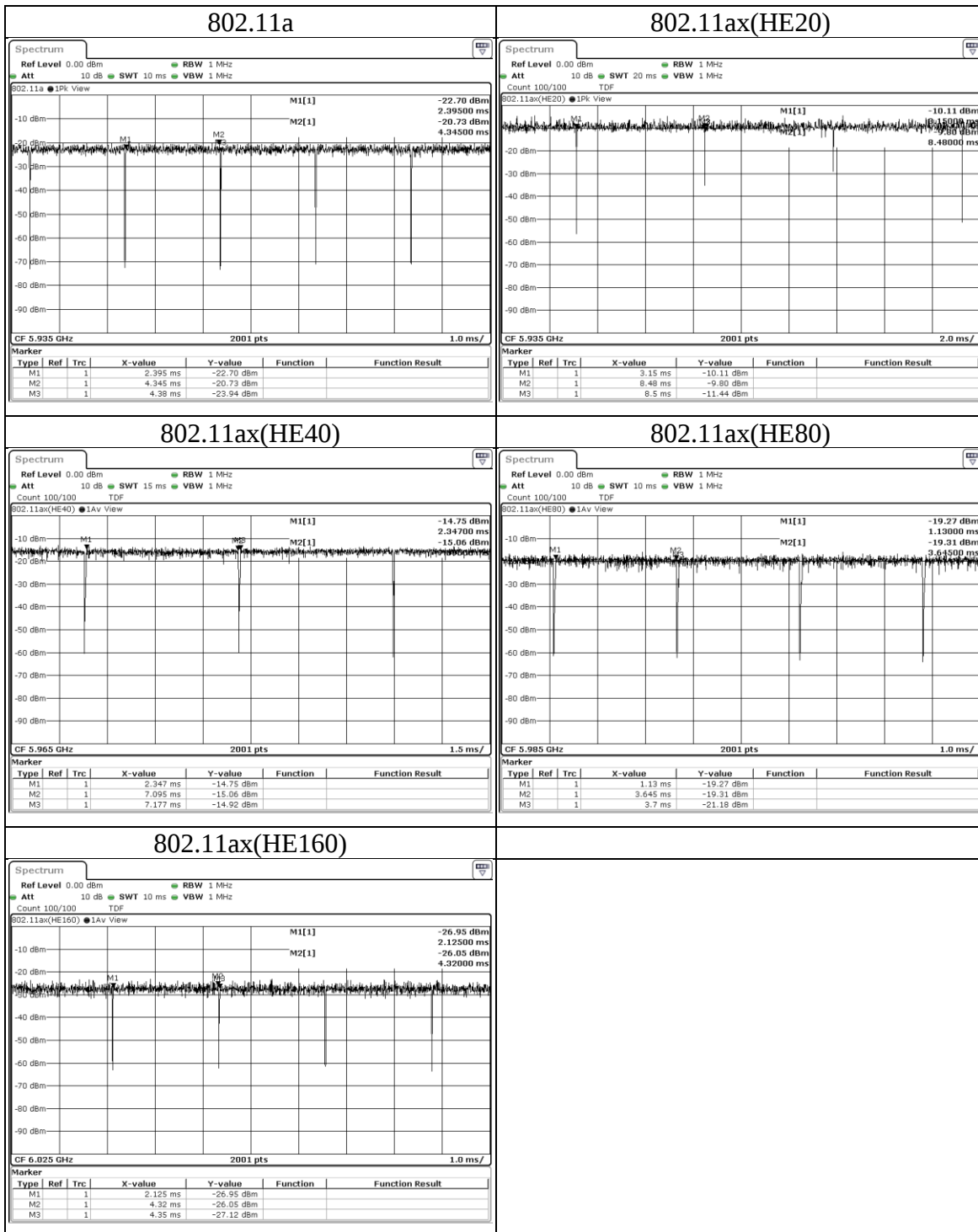
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7. Test Equipment

Test Equipment List					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Expired date
Radiated Spurious Emission					
Spectrum Analyzer	Keysight	N9010A	MY56070827	2020/11/11	2021/11/10
EMI Test Receiver	Rohde & Schwarz	ESR7	101754	2020/12/11	2021/12/10
Loop Antenna	ETS lindgren	6502	00213440	2020/12/25	2021/12/24
Trilog-Broadband Antenna with 5dB Attenuator	Schwarzbeck & EMCI	VULB 9168 & N-6-05	774 & AT-N0538	2021/1/13	2022/1/12
Horn Antenna (1-18 GHz)	Schwarzbeck	BBHA 9120 D	01690	2020/12/30	2021/12/29
Horn Antenna (18-40 GHz)	Schwarzbeck	BBHA 9170	781	2020/12/30	2021/12/29
Preamplifier (30-1000 MHz)	EMCI	EMC330E	980405	2021/6/8	2022/6/7
Preamplifier (1-18 GHz)	EMCI	EMC051835BE	980406	2021/2/3	2022/2/2
Preamplifier (18-40GHz)	EMCI	EMC184040SEE	980426	2021/5/19	2022/5/18
Cables	Hanyitek	K1K50-UP0264-K1K50-2500	170214-4 & 170425-2	2021/1/22	2022/1/21
Cables	Hanyitek	K1K50-UP0264-K1K50-2500	170214-1 & 170214-2	2021/1/22	2022/1/21

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Test Equipment List					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Expired date
Antenna Port Conducted Measurement					
Spectrum Analyzer	Keysight	N9010A	MY56070834	2020/11/6	2021/11/5
				2021/10/29	2022/10/28
Pulse Power Sensor	Anritsu	MA2411B	1531202	2020/12/21	2021/12/20
				2021/12/22	2022/12/21
Power Meter	Anritsu	ML2495A	1645002	2020/12/21	2021/12/20
				2021/12/22	2022/12/21
Temperature & Humidity Test Chamber	GIANT FORCE	GTH-150-40-CP-AR	MAA1701-010	2021/3/22	2022/3/21
AC power Line Conducted Emission					
EMI Test Receiver	Rohde & Schwarz	ESR7	101753	2020/11/17	2021/11/16
Two-Line V-Network	Rohde & Schwarz	ENV216	102136	2021/8/30	2022/8/29
Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	2021/8/26	2022/8/25
Cables	TITAN	CFD200	T0732ACFD20 020A300-1	2021/3/2	2022/3/1
Contention Based Protocol Measurement					
Spectrum Analyzer	Keysight	N9010A	MY56070834	2020/11/6	2021/11/5
				2021/10/29	2022/10/28
Signal Generator	Keysight	N5182B	MY57300028	2020/11/18	2021/11/17

UL Software		
Description	Name	Version
Radiated measurement	e3	6.191211 (V6)
Conducted measurement	RF Conducted Test Tools	ver 2.4.0.620b
AC power Line Conducted Emission	EZ_EMC	UL-3A1.2

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8. Description of Test Setup

Support Equipment

ID	Equipment	Brand Name	Model Name	S/N	Remark
A	Laptop	Lenovo	E6430	2MMN3X1	Provide by lab
B	Mini PCI-E to ExpressCard board	SparkLAN	Card-01	001	N/A

Test Setup

Controlled using a bespoke application (QSPR_Version 5.0-00197) on a test Notebook. The application was used to enable a continuous transmission mode and to select the test channels, data rates, modulation schemes and power setting as required.

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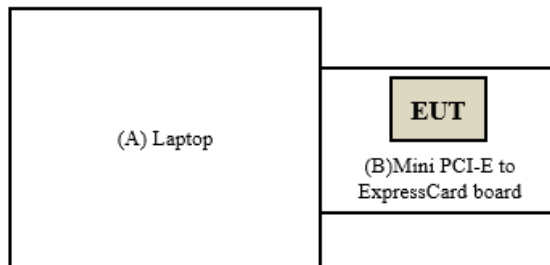
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Setup Diagram for Test



Under Table

Remote Site

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9. Test Results

9.1. 26dB Bandwidth

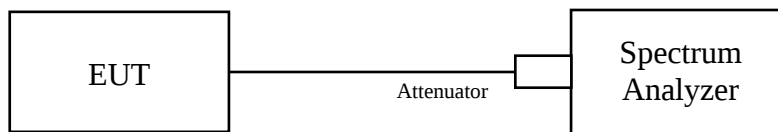
Requirements

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

Test procedure

- Set RBW = approximately 1% of the emission bandwidth.
- Set the VBW > RBW.
- Detector = Peak.
- Trace mode = max hold.
- Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
- Test Result = Marker 3 – Marker 2

Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

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Test Data

Mode	CH	Freq (MHz)	26dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11a	2	5935	18.371	19.652	320	Pass
	1	5955	18.513	18.286	320	Pass
	45	6175	18.526	18.894	320	Pass
	93	6415	18.327	19.392	320	Pass
	97	6435	18.414	18.849	320	Pass
	105	6475	19.014	19.577	320	Pass
	113	6515	18.52	19.115	320	Pass
	117	6535	18.412	18.759	320	Pass
	149	6695	18.63	18.767	320	Pass
	181	6855	18.365	18.512	320	Pass
	185	6875	18.69	18.977	320	Pass
	209	6995	18.345	19.576	320	Pass
	229	7095	19.121	18.993	320	Pass
	233	7115	18.579	18.737	320	Pass

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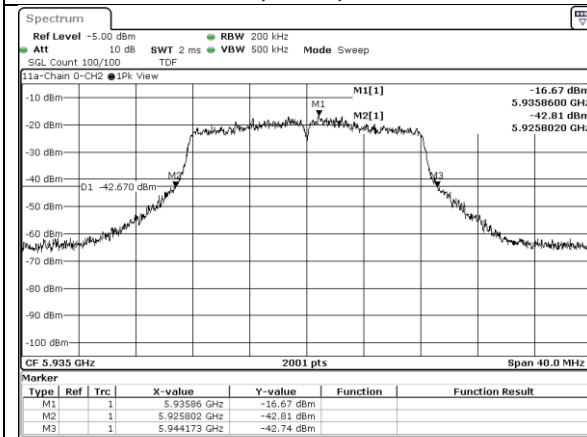
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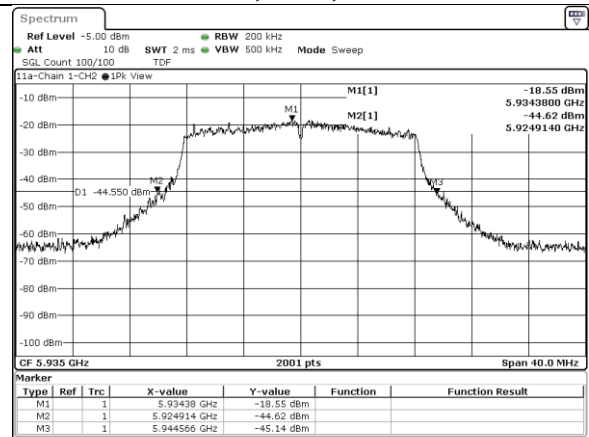


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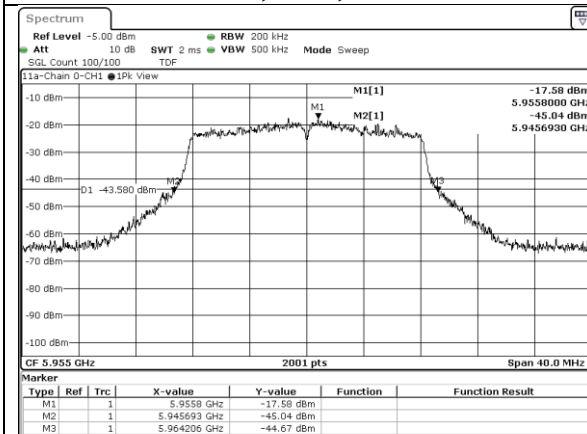
802.11a, CH2, Chain 0



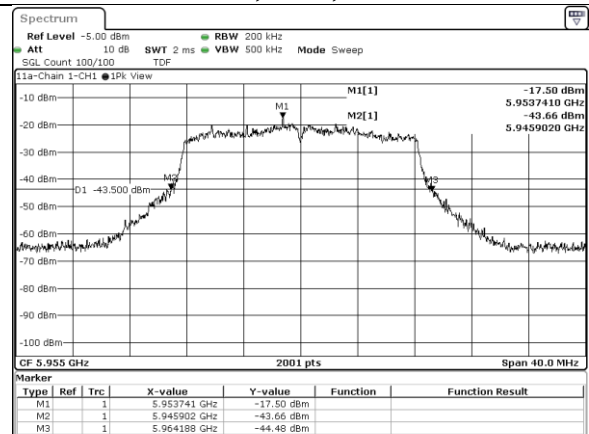
802.11a, CH2, Chain 1



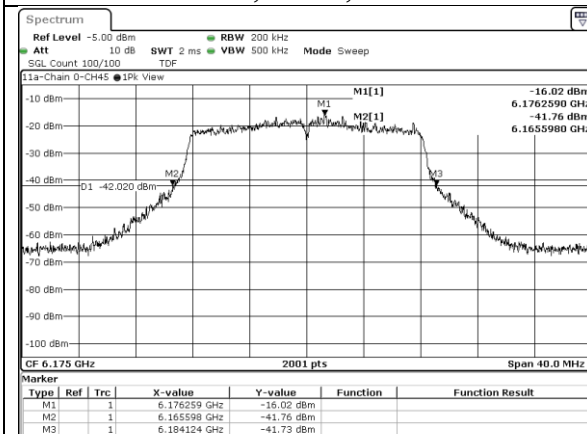
802.11a, CH1, Chain 0



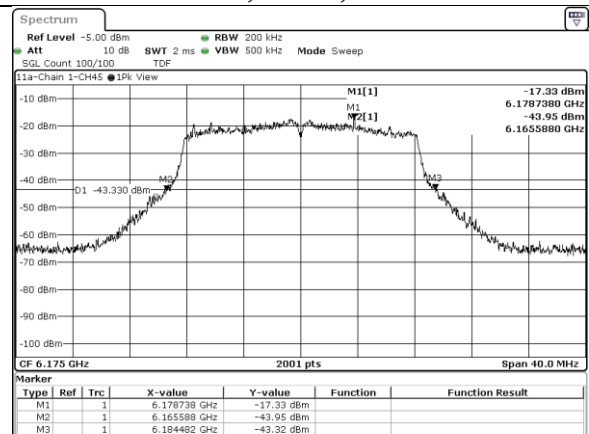
802.11a, CH1, Chain 1



802.11a, CH45, Chain 0



802.11a, CH45, Chain 1



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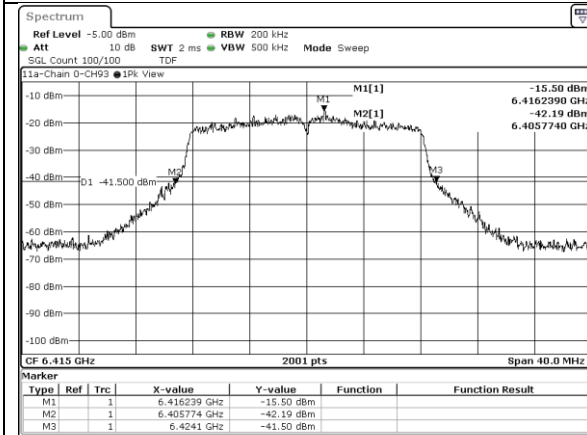
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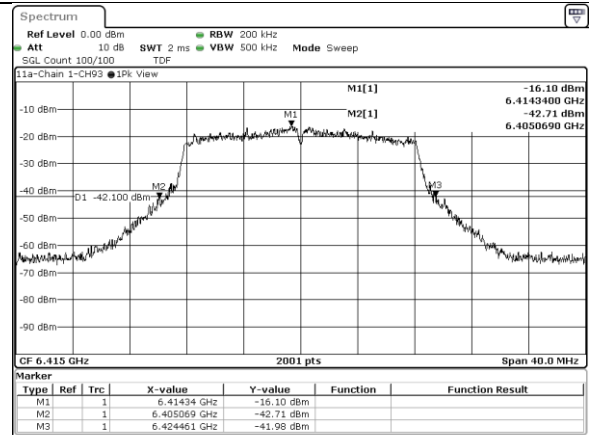


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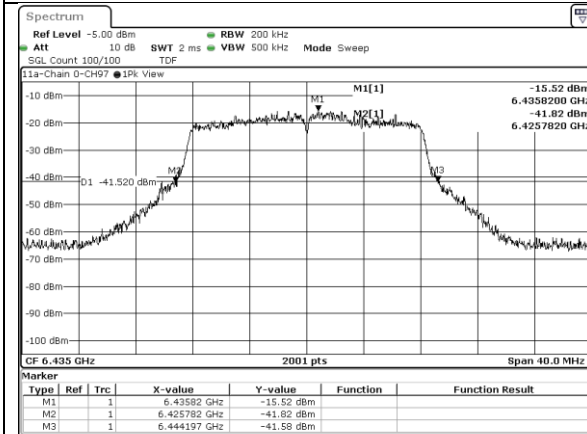
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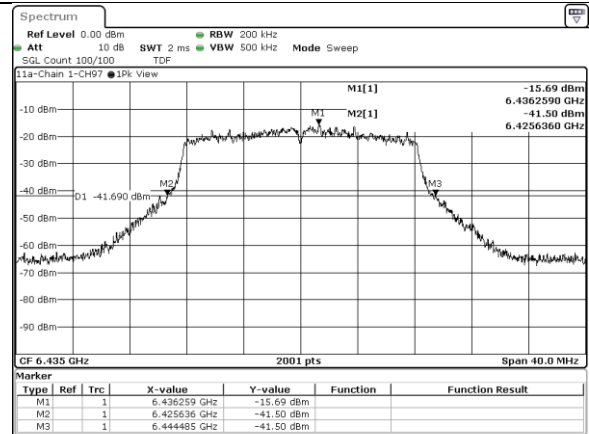
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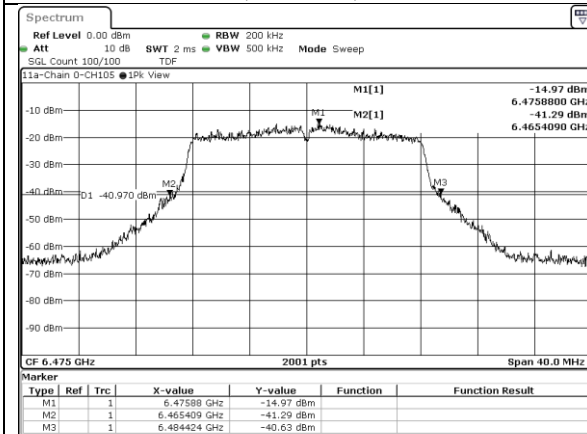
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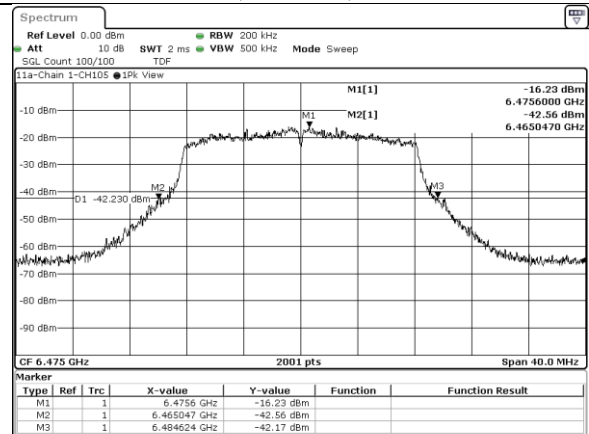
802.11a, CH97, Chain 1



802.11a, CH105, Chain 0



802.11a, CH105, Chain 1



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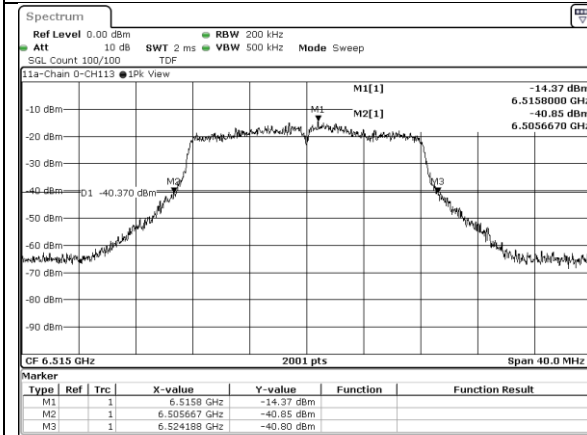
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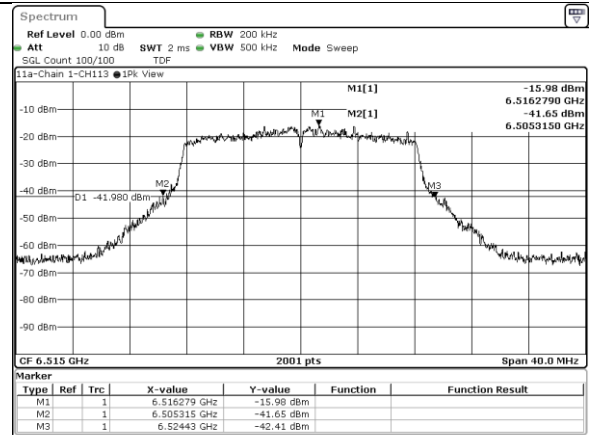


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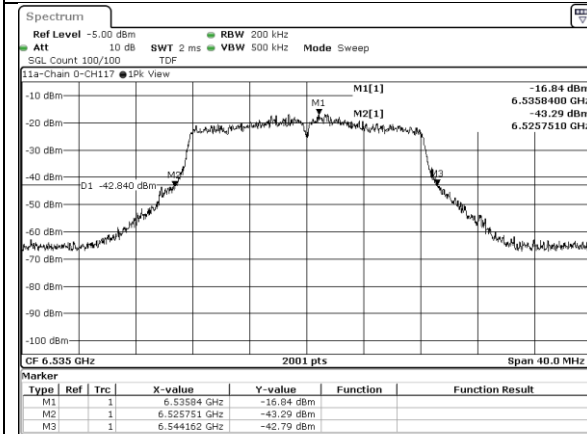
802.11a, CH113, Chain 0



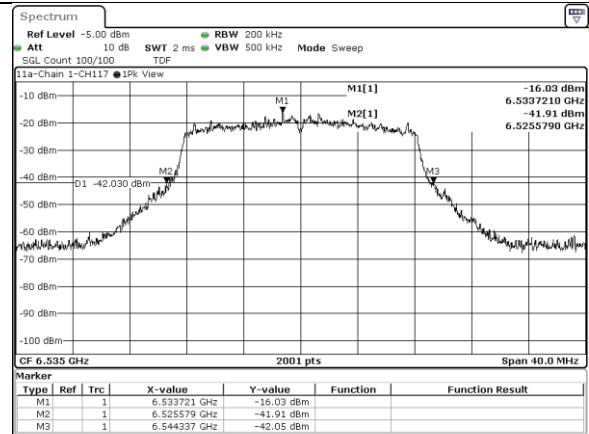
802.11a, CH113, Chain 1



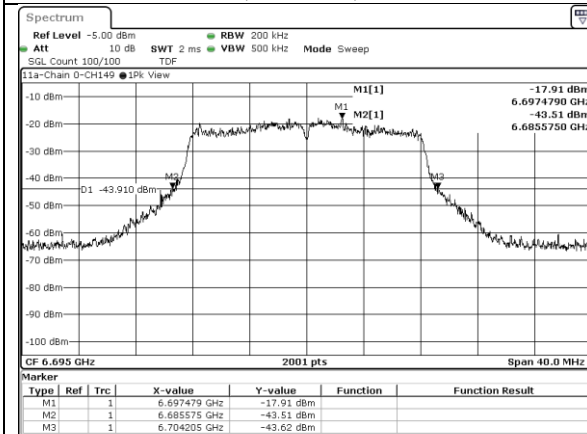
802.11a, CH117, Chain 0



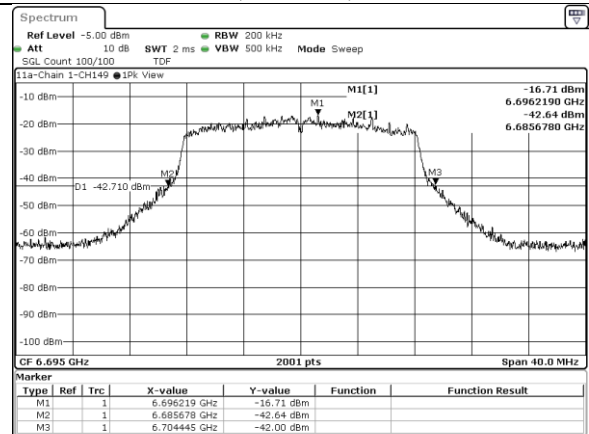
802.11a, CH117, Chain 1



802.11a, CH149, Chain 0



802.11a, CH149, Chain 1



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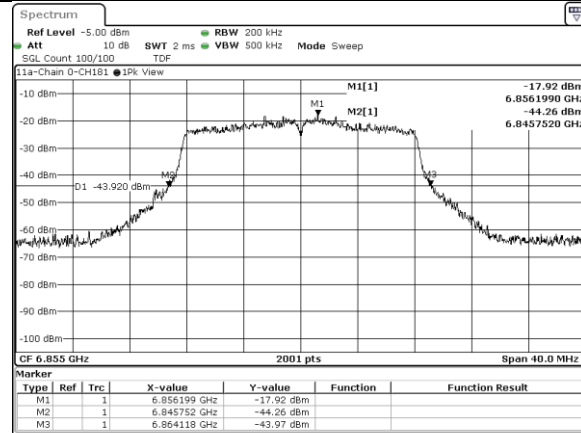
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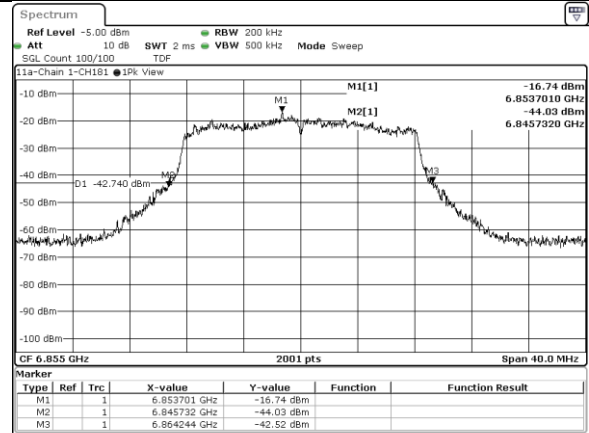


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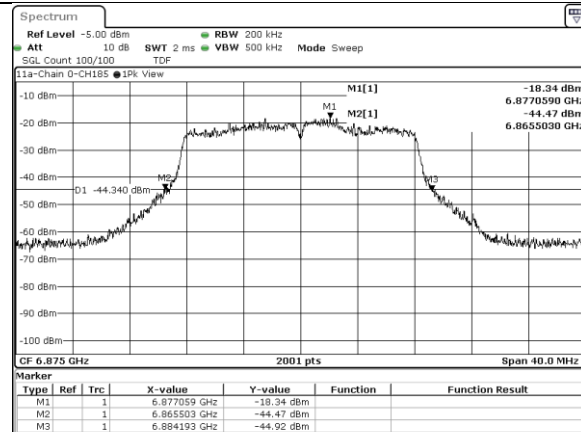
802.11a, CH181, Chain 0



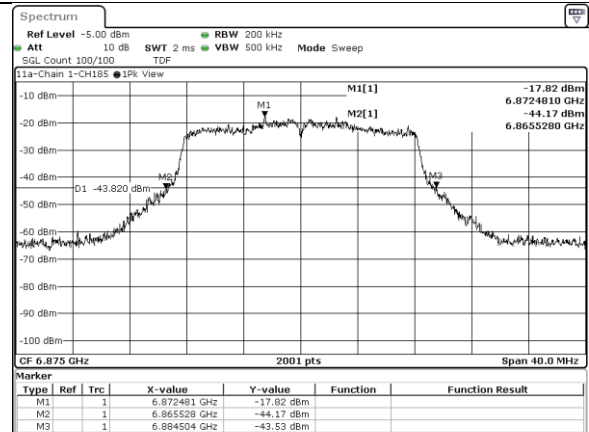
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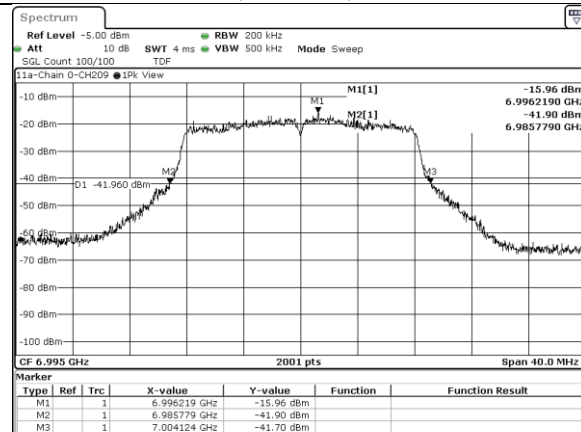
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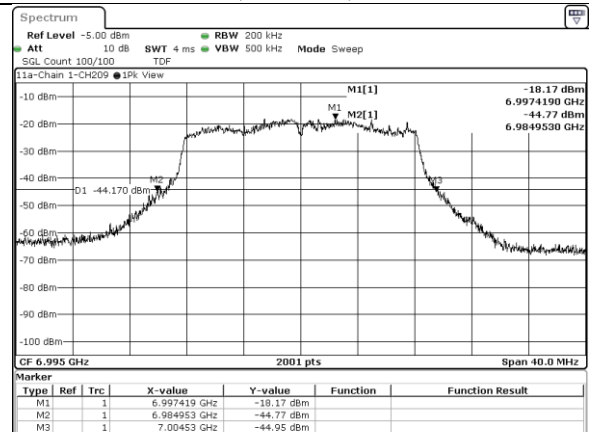
802.11a, CH185, Chain 1



802.11a, CH209, Chain 0



802.11a, CH209, Chain 1



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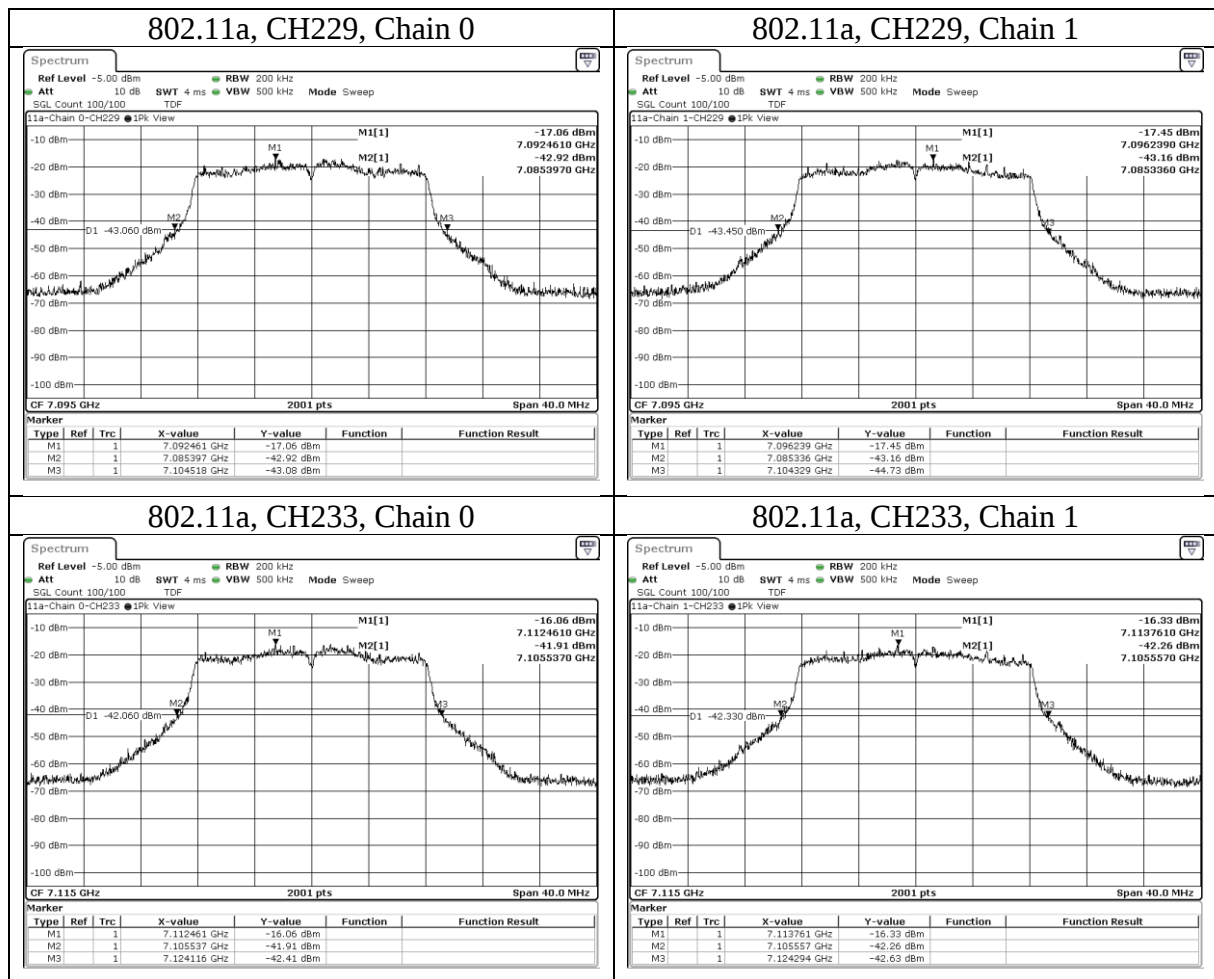
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Mode	CH	Freq (MHz)	26dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE20)	2	5935	20.436	20.781	320	Pass
	1	5955	20.635	20.22	320	Pass
	45	6175	20.588	20.754	320	Pass
	93	6415	20.478	20.53	320	Pass
	97	6435	20.598	20.644	320	Pass
	105	6475	20.51	20.586	320	Pass
	113	6515	20.703	20.379	320	Pass
	117	6535	20.673	20.499	320	Pass
	149	6695	20.464	20.485	320	Pass
	181	6855	20.628	20.366	320	Pass
	185	6875	20.47	20.464	320	Pass
	209	6995	20.555	20.751	320	Pass
	229	7095	20.258	20.644	320	Pass
	233	7115	20.668	20.583	320	Pass
	185	6875	20.47	20.464	320	Pass
	209	6995	20.555	20.751	320	Pass
	229	7095	20.258	20.644	320	Pass
	233	7115	20.668	20.583	320	Pass

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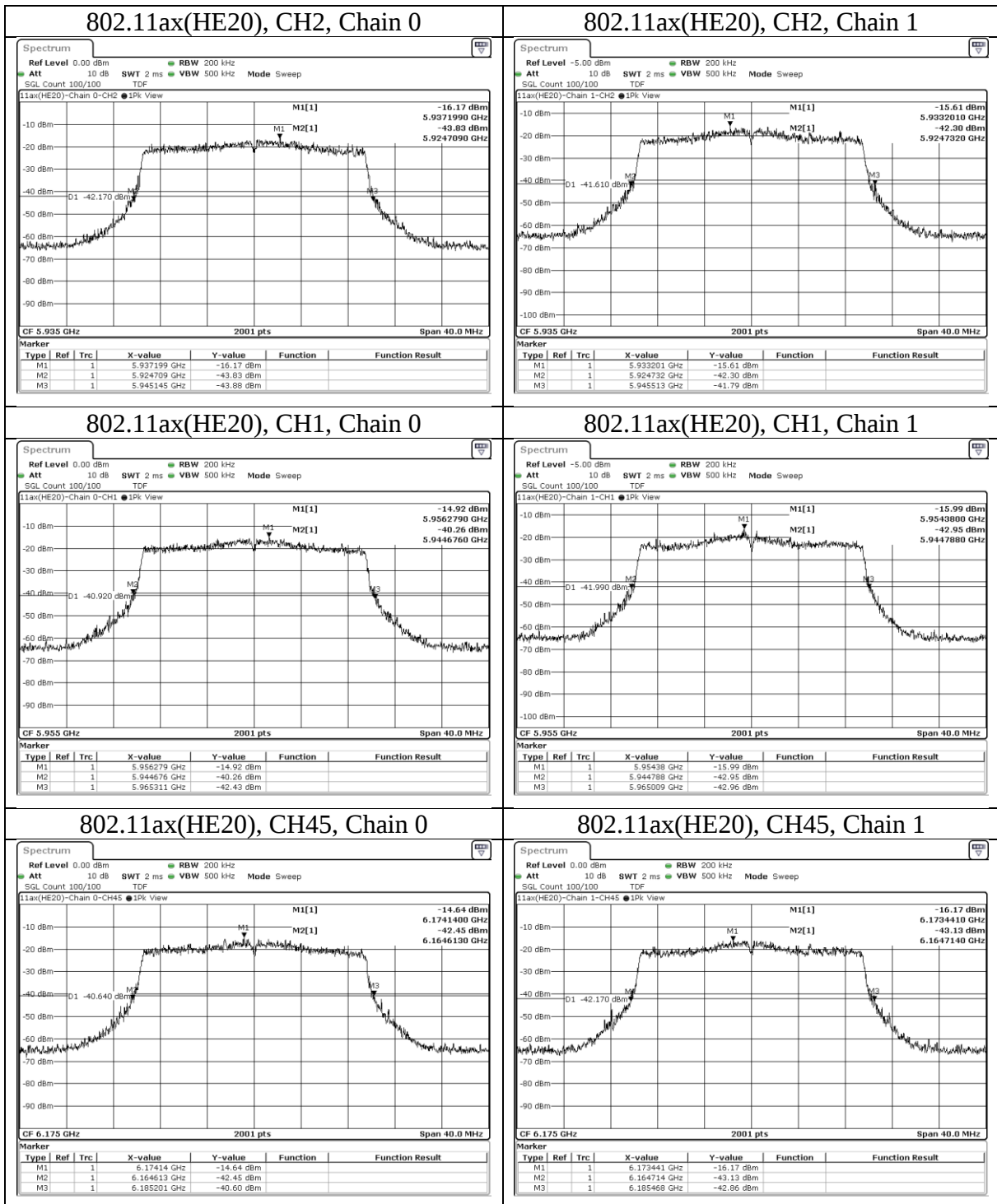
Telephone :+886-2-7737-3000

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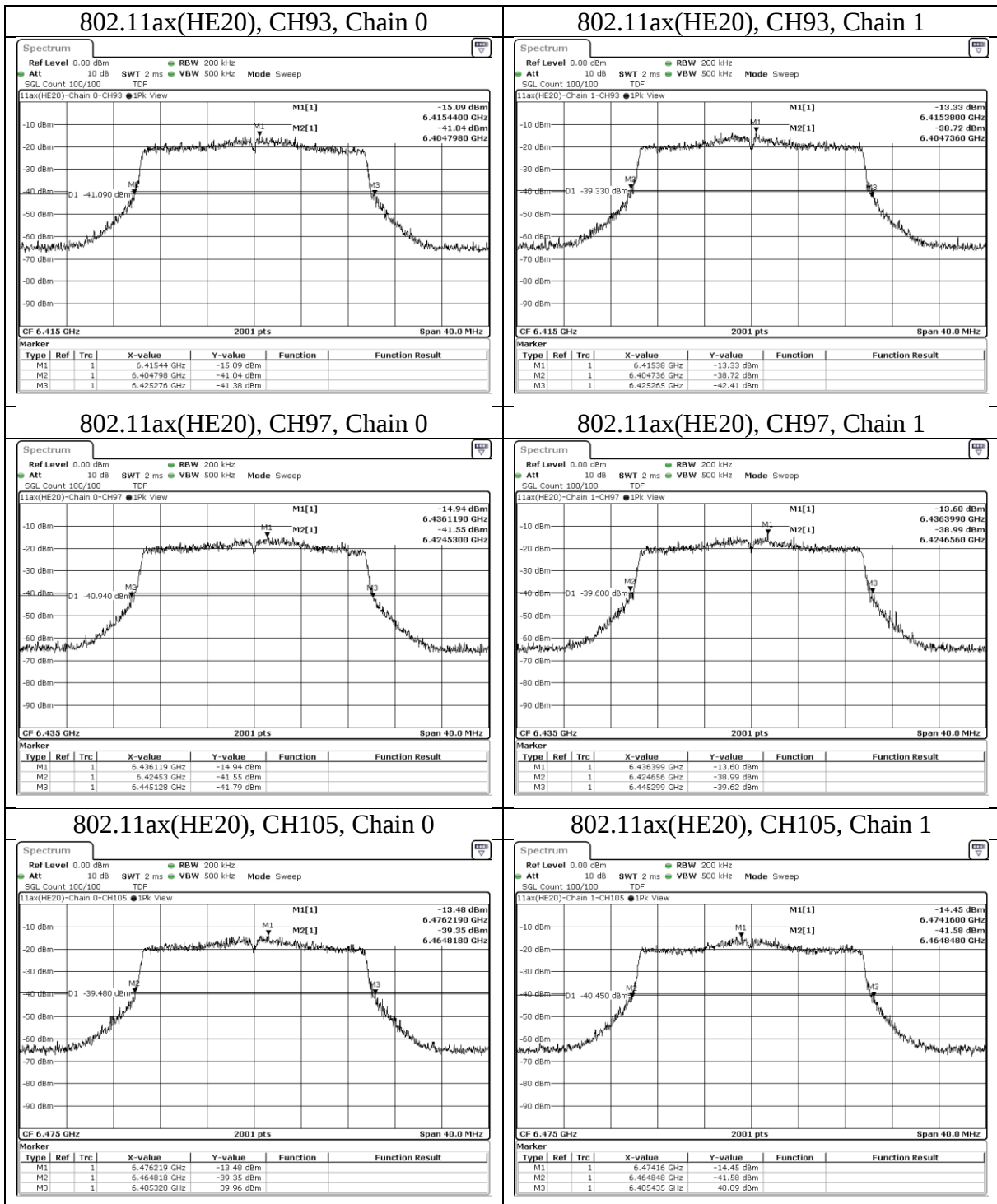
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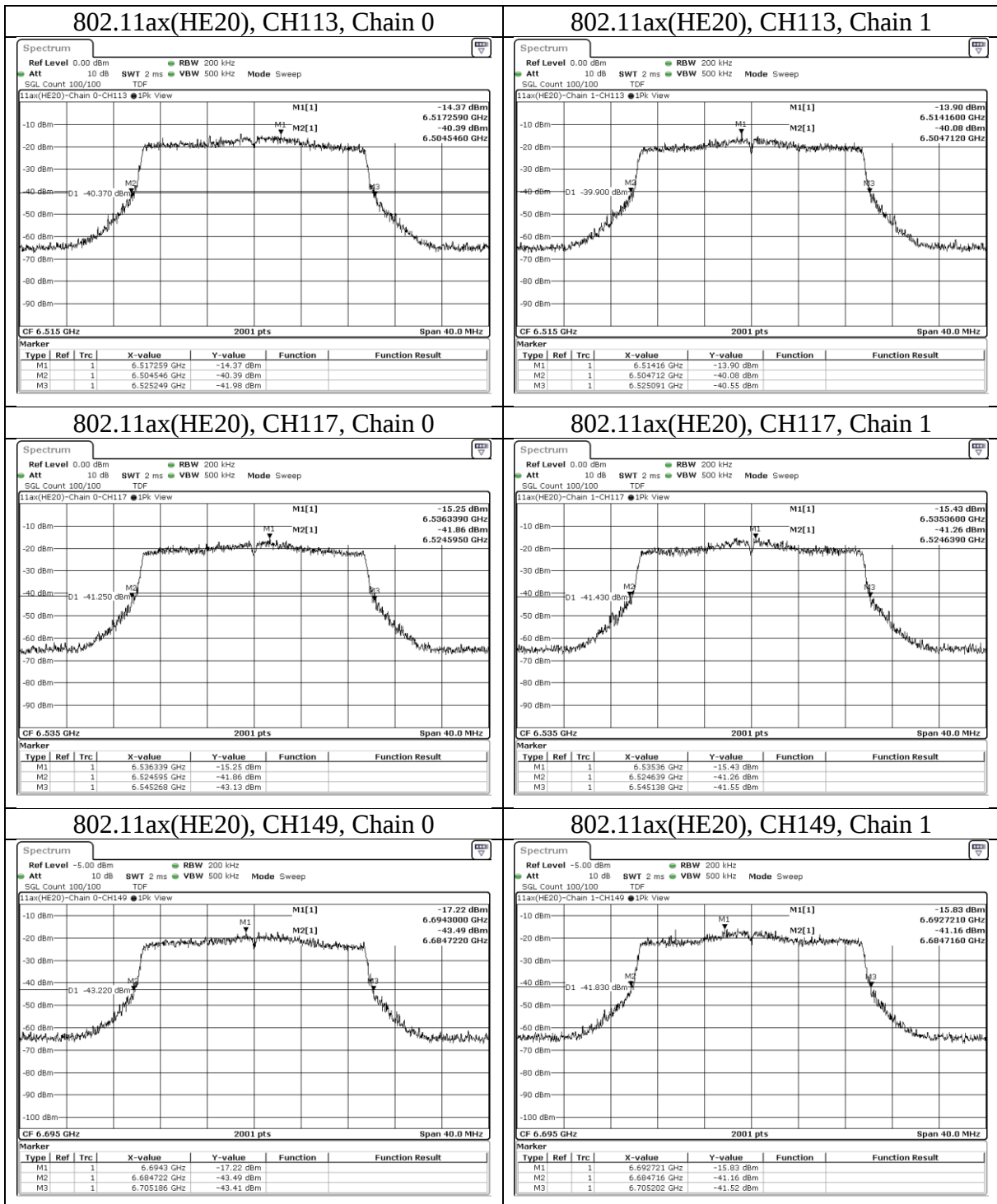
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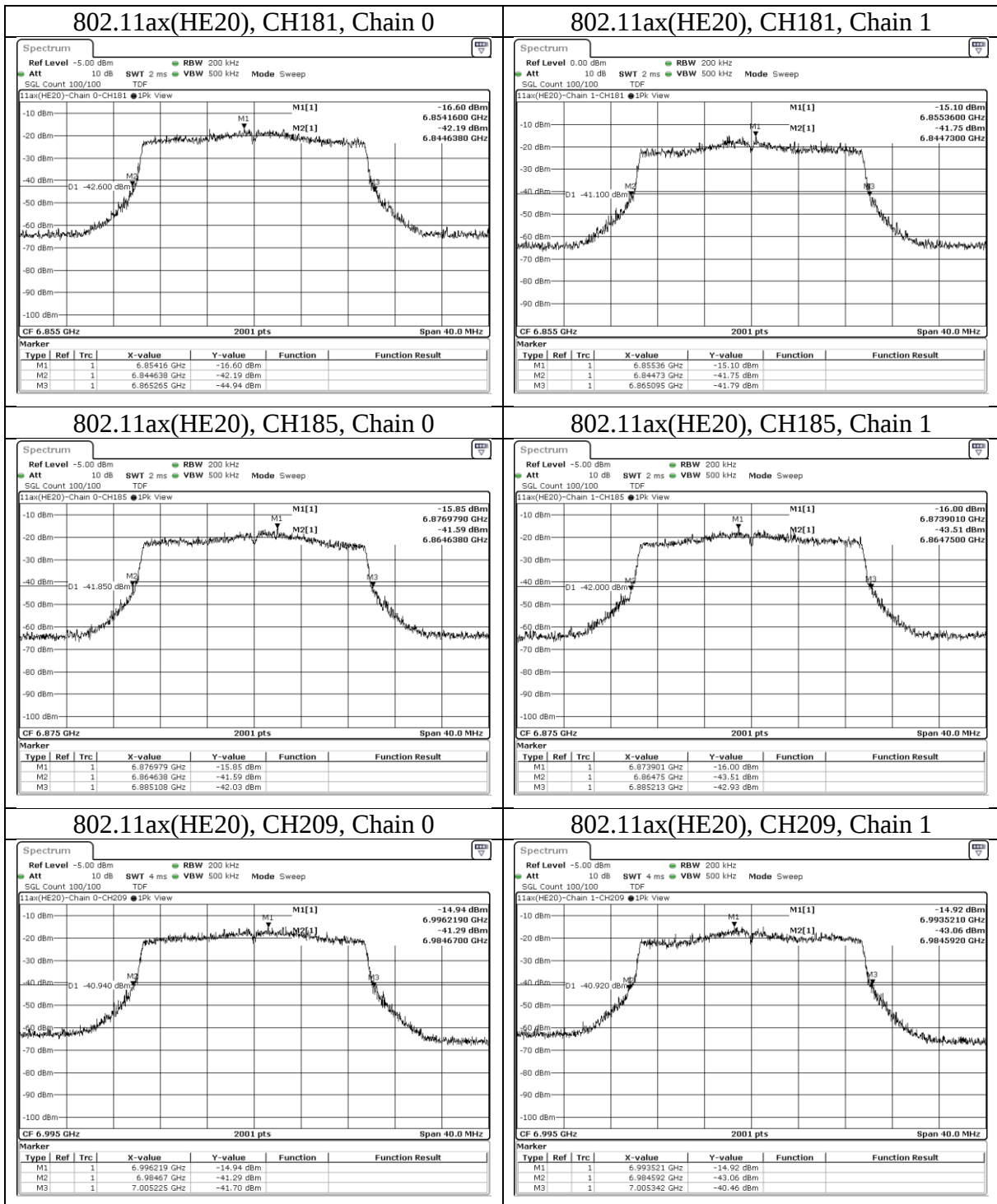
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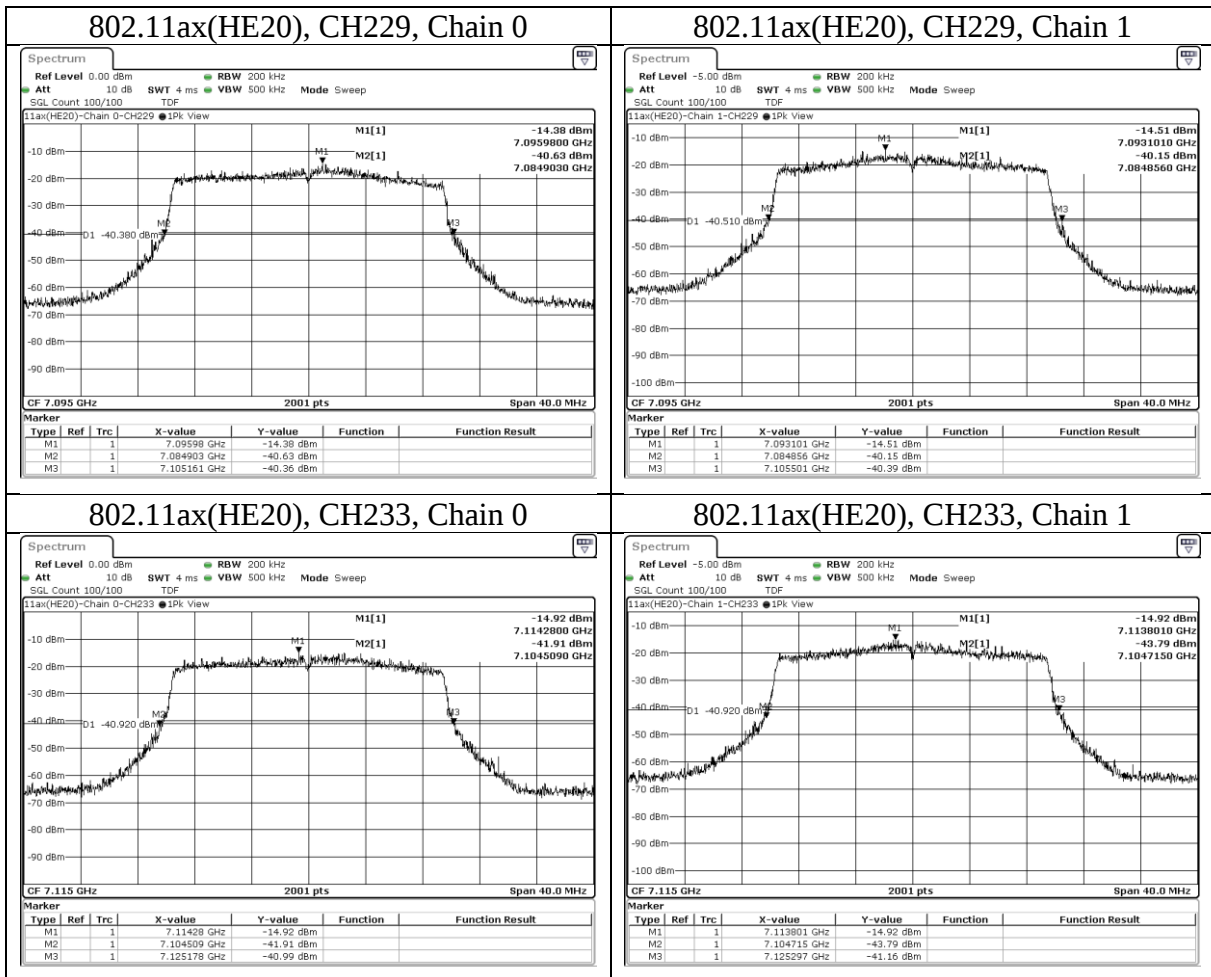
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Mode	CH	Freq (MHz)	26dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE40)	3	5965	40.679	40.127	320	Pass
	43	6165	40.241	40.129	320	Pass
	91	6405	40.483	40.112	320	Pass
	99	6445	40.214	40.674	320	Pass
	107	6485	41.041	40.026	320	Pass
	115	6525	39.934	40.167	320	Pass
	123	6565	39.77	40.113	320	Pass
	155	6725	39.576	40.563	320	Pass
	179	6845	40.093	39.71	320	Pass
	187	6885	39.482	40.716	320	Pass
	211	7005	40.398	39.74	320	Pass
	227	7085	39.828	40.102	320	Pass

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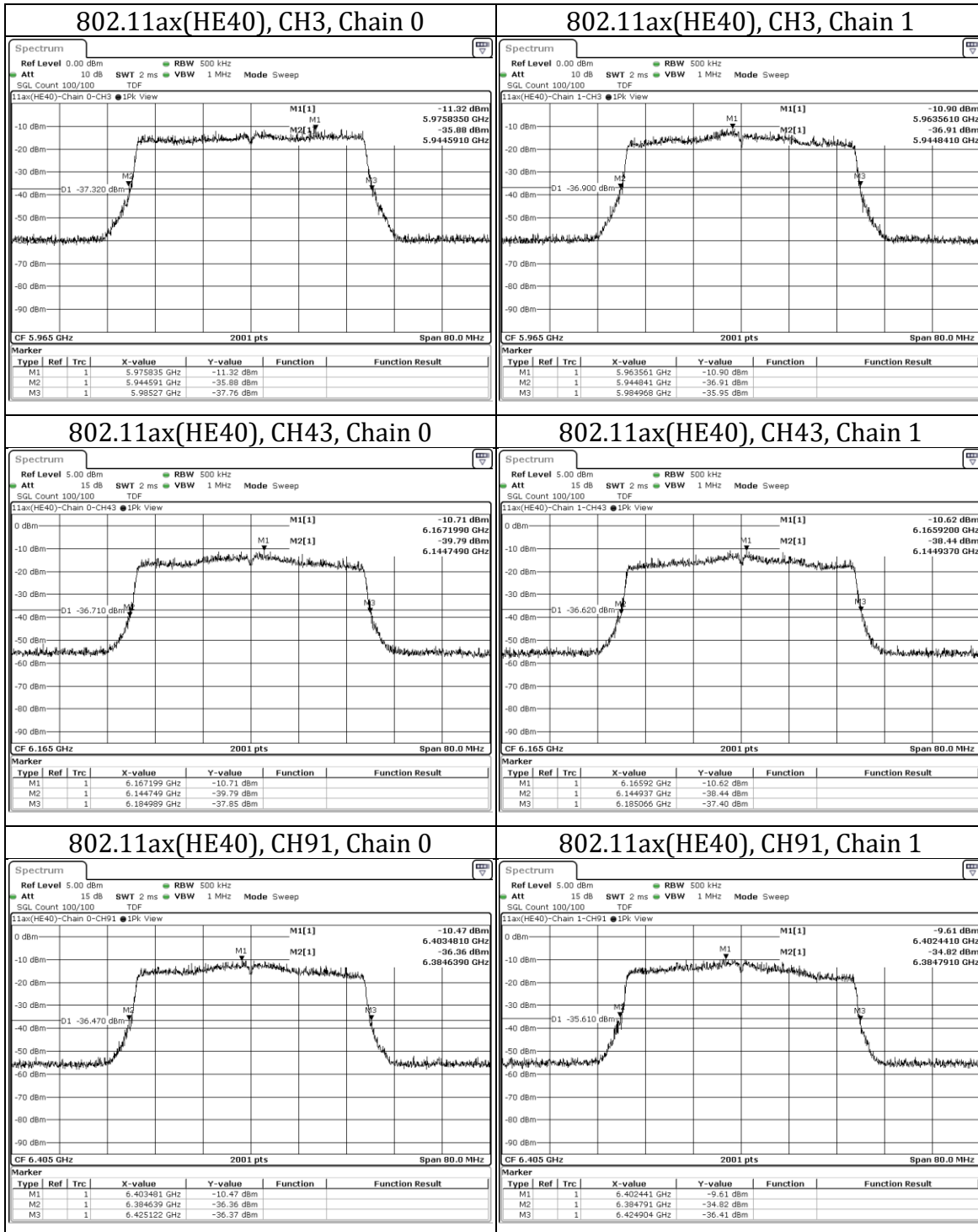
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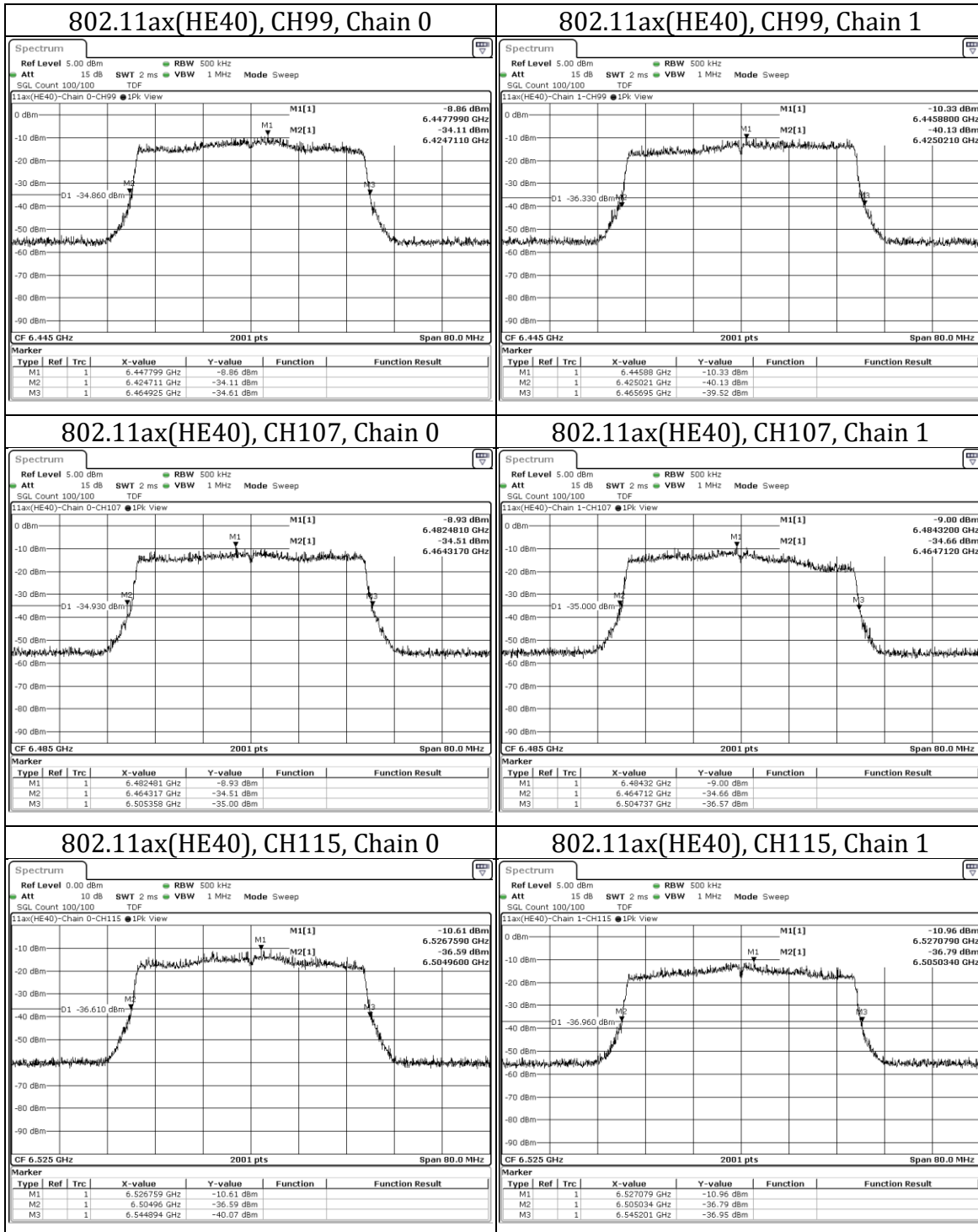
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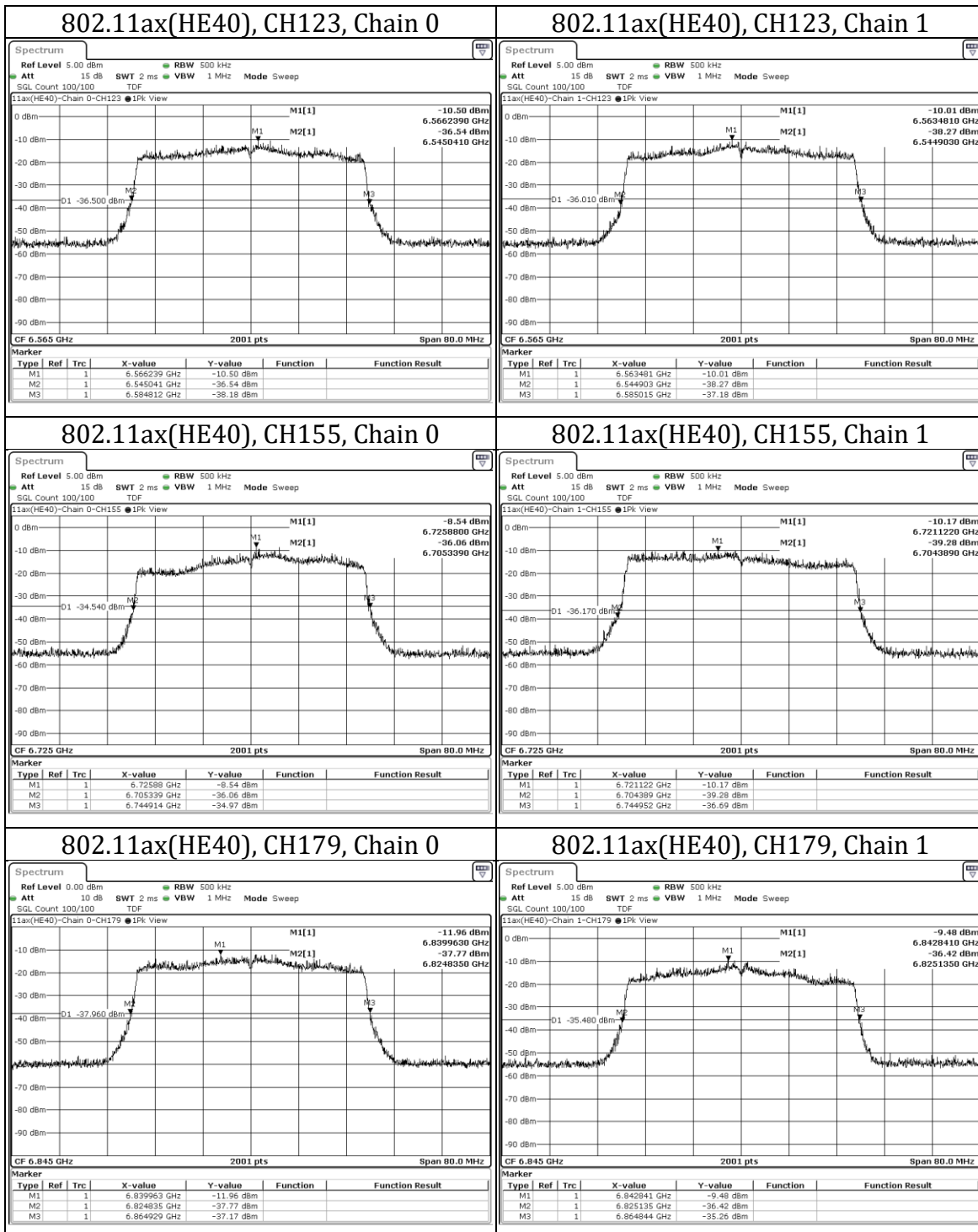
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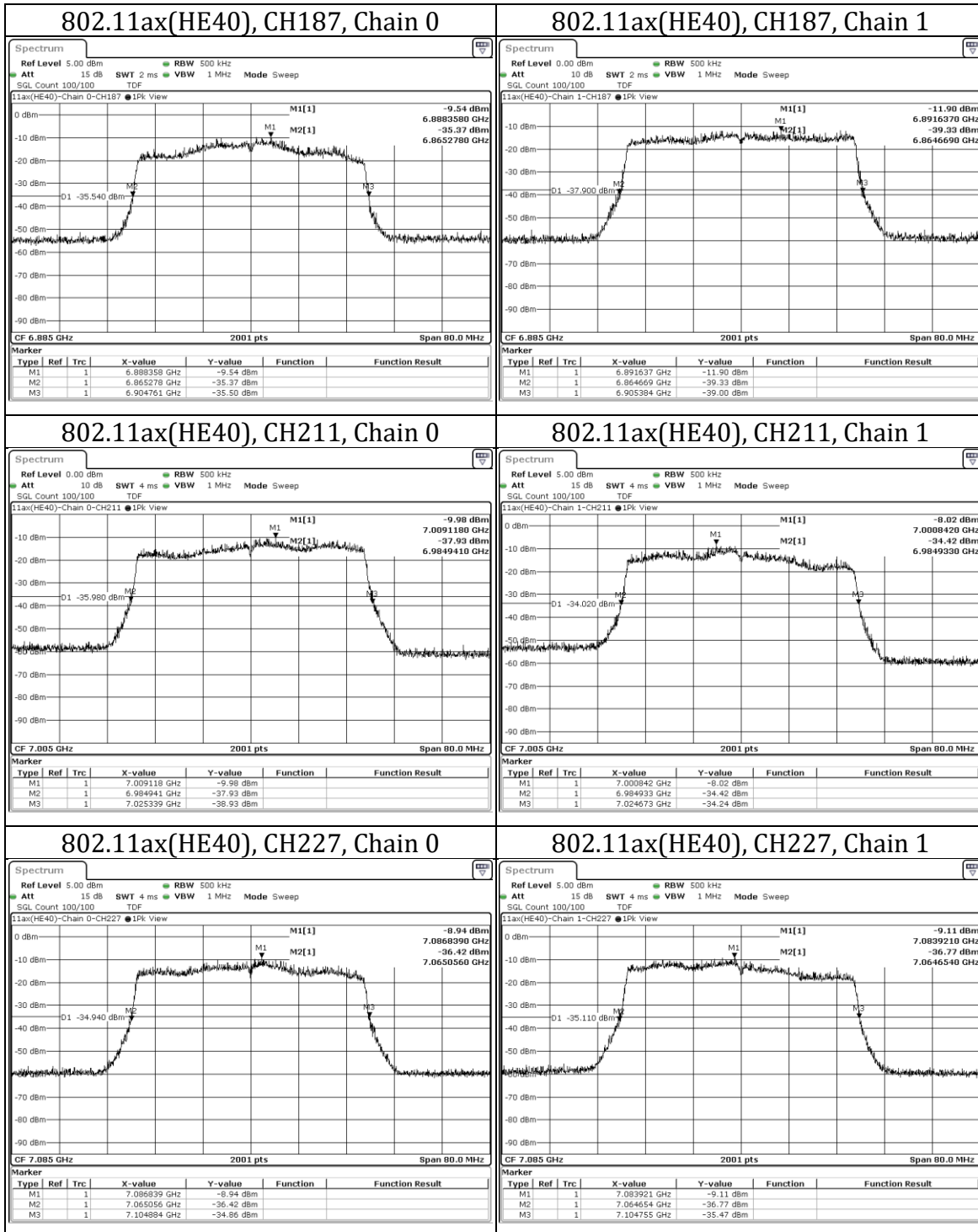
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Mode	CH	Freq (MHz)	26dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE80)	7	5985	80.688	82.591	320	Pass
	39	6145	80.945	83.147	320	Pass
	87	6385	81.098	80.372	320	Pass
	103	6465	81.392	80.599	320	Pass
	119	6545	81.229	80.278	320	Pass
	135	6625	80.944	81.223	320	Pass
	151	6705	83.312	80.202	320	Pass
	167	6785	81.999	81.811	320	Pass
	183	6865	81.27	80.945	320	Pass
	199	6945	80.823	82.28	320	Pass
	215	7025	81.157	82.74	320	Pass

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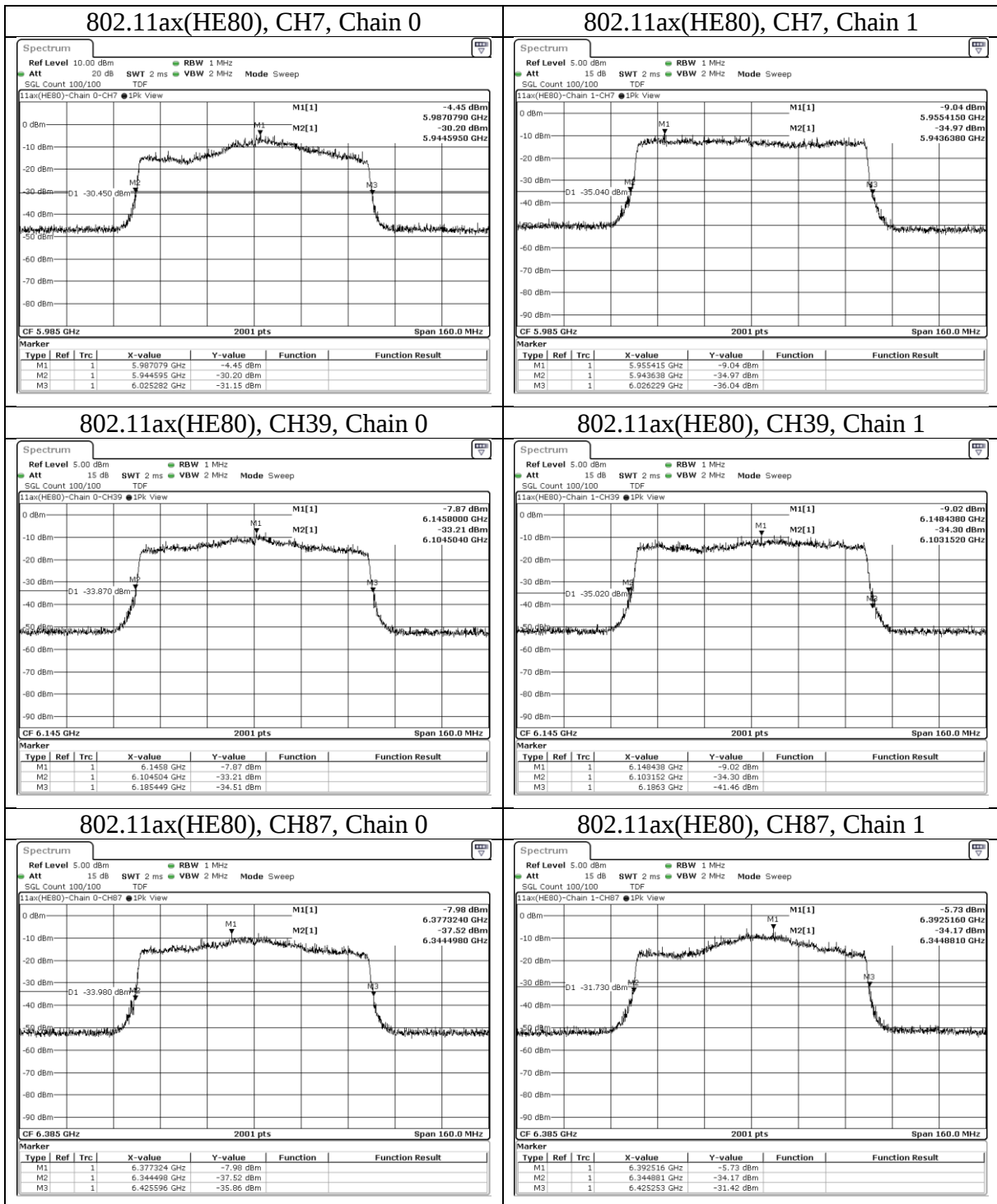
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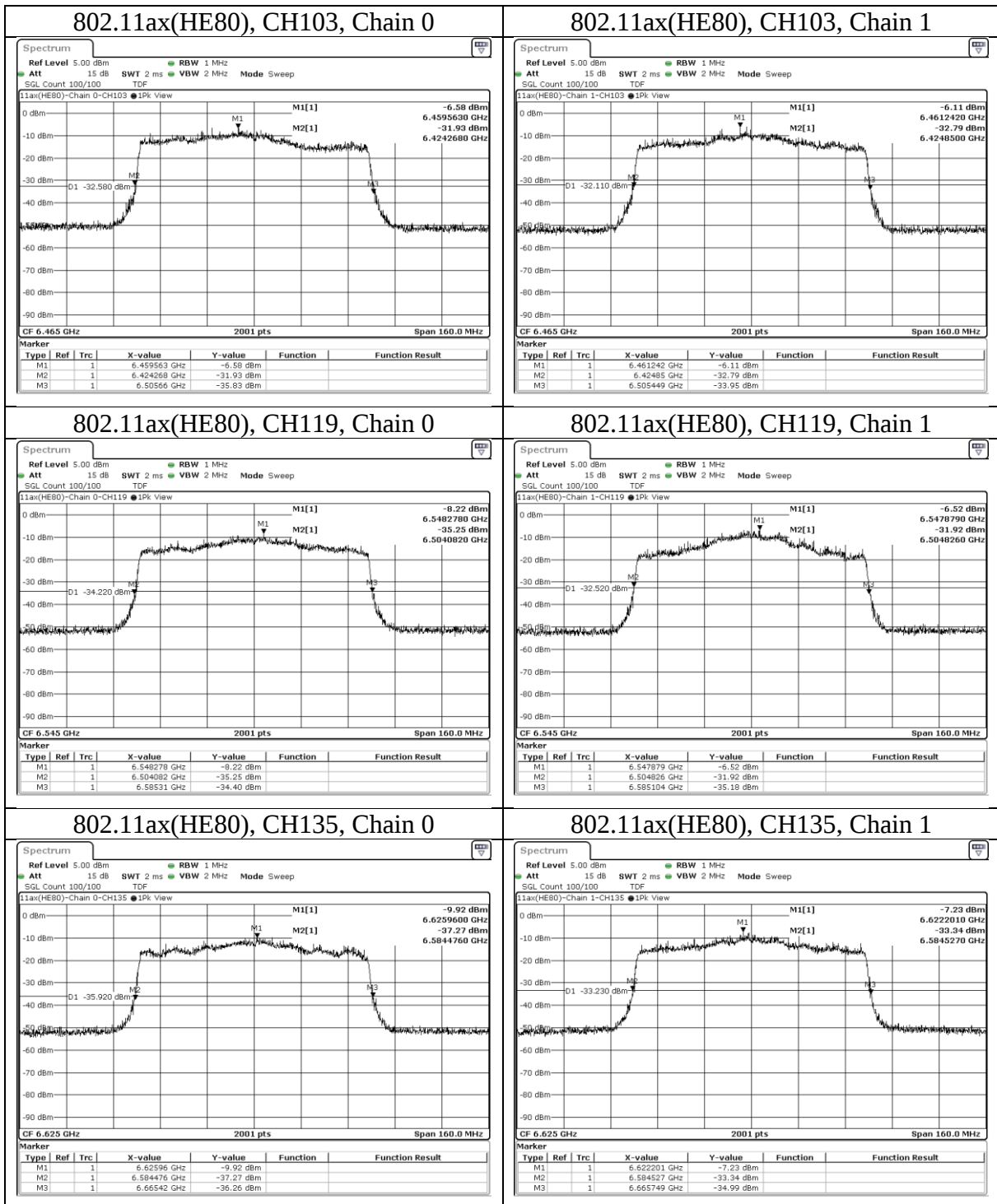
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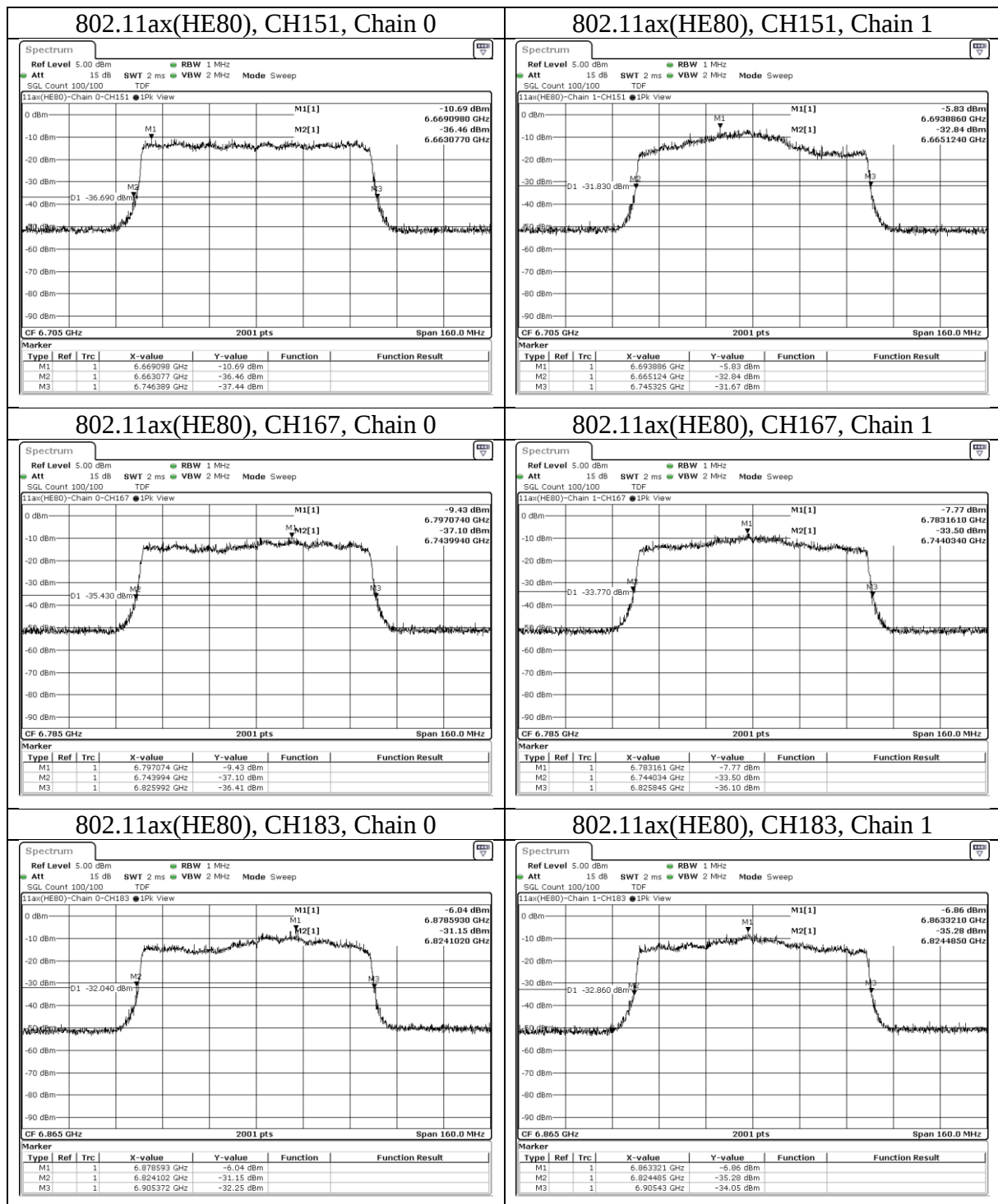
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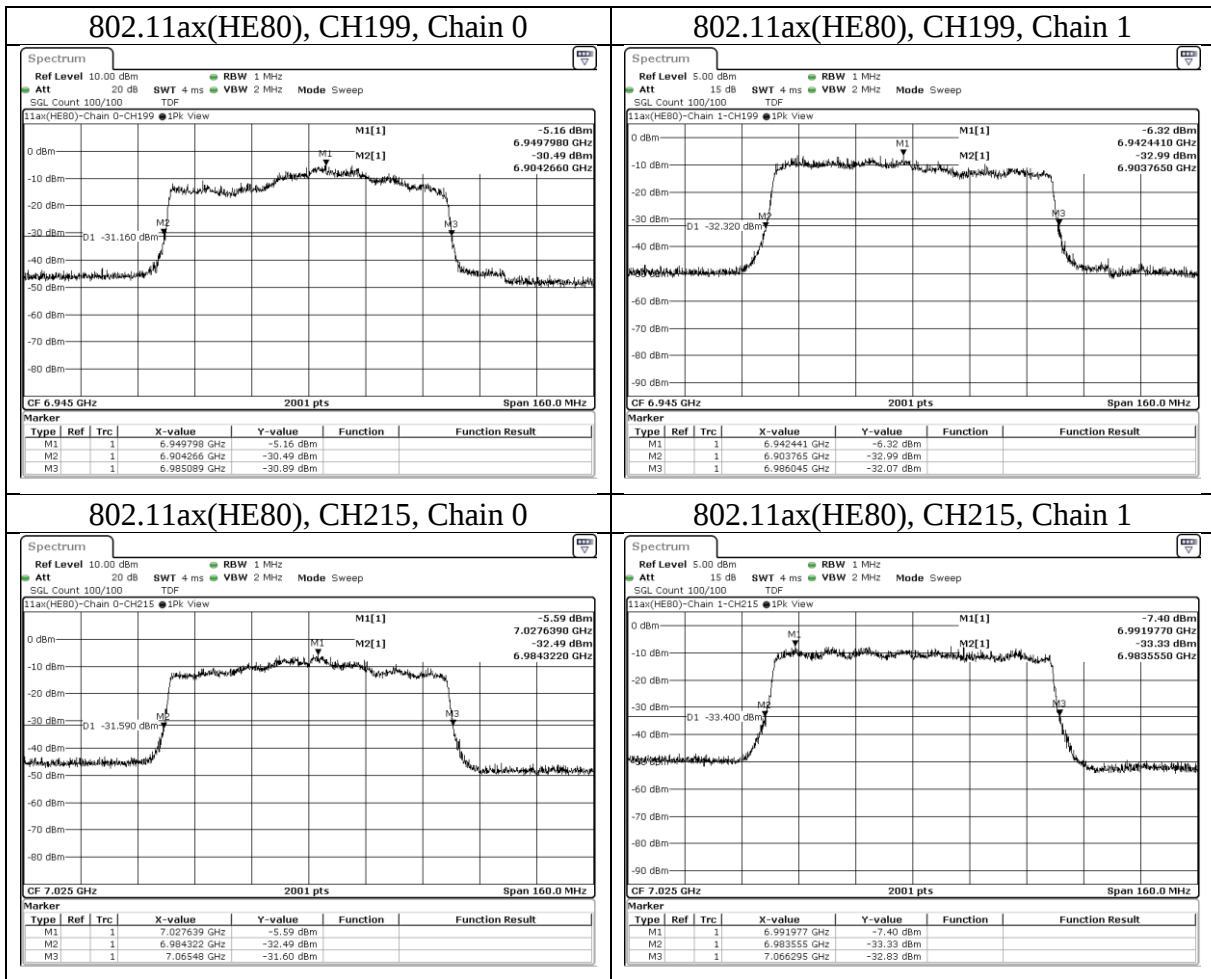
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Mode	CH	Freq (MHz)	26dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE160)	15	6025	170.14	169.572	320	Pass
	47	6185	169.469	171.543	320	Pass
	79	6345	169.17	169.091	320	Pass
	111	6505	169.605	170.216	320	Pass
	143	6665	168.536	167.804	320	Pass
	175	6825	169.339	171.412	320	Pass
	207	6985	170.161	168.774	320	Pass

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