

RADIO TEST REPORT

Product : Cable Gateway
Model Name : CBV390SL5-X57
Series Model : Infinity 601
FCC ID : RK9-INFINITY601
Test Regulation : FCC 47 CFR Part 15 Subpart E (Section 15.407)
Received Date : 2023/2/23
Test Date : 2023/2/23 ~ 2023/4/12
Issued Date : 2023/6/6

Applicant : CastleNet Technology Inc.
No. 14, Ln. 141, Sec. 3, Beishen Rd., Shenkeng Dist., New Taipei City 22244, 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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1. Attestation of Test Results

APPLICANT: CastleNet Technology Inc.
No. 14, Ln. 141, Sec. 3, Beishen Rd., Shenkeng Dist., New Taipei
City 22244, Taiwan (R.O.C.)

MANUFACTURER: CastleNet Technology Inc.
No. 14, Ln. 141, Sec. 3, Beishen Rd., Shenkeng Dist., New Taipei
City 22244, Taiwan (R.O.C.)

EUT DESCRIPTION: Cable Gateway

MODEL: CBV390SL5-X57

SERIES MODEL: Infinity 601

SAMPLE STAGE: Pilot-run Verification Test sample

DATE of TESTED: 2023/2/23 ~ 2023/4/12

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:



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Date : 2023/6/6

Approved and Authorized By:



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2. Summary of Test Results

Summary of Test Results		
FCC Clause	Test Items	Result
15.407(e)	6dB Bandwidth	PASS
15.403(i)	26dB Bandwidth	PASS
2.1049	Occupied Bandwidth	See Note1
15.407(a)(1/2/3)	Conducted Output Power	PASS
15.407(a)(1/2/3)	Power Spectral Density	PASS
15.407(g)	Frequency Stability	PASS
15.407(b) (1/2/3/4(i/ii)/9)	Radiated Emissions and Band Edge Measurement	PASS
15.407(b)(9)	AC Power Conducted Emission	PASS
15.203	Antenna Requirement	PASS
15.407(h)	Dynamic Frequency Selection & Transmit power control	See Note2

Note:

1. The Occupied Bandwidth was reference only.
2. The “Dynamic Frequency Selection & Transmit power control measurement” was recorded in Report No.: 4790688499-US-R2-V0

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 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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Doc No: Form-ULID-004739 (DCS:17-EM-F0878) / 6.1

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 $k=2$.

Determining compliance based on the results of the compliance measurement, not considering measurement instrumentation uncertainty.

Measurement	Frequency	Uncertainty
Conducted disturbance at mains terminals ports	150kHz ~ 30MHz	± 2.9 dB
RF Conducted	9 kHz - 40GHz	± 2.4 dB
Radiated disturbance below 30MHz	9 kHz - 30 MHz	± 1.9 dB
Radiated disturbance below 1 GHz	30MHz ~ 1GHz	± 5.8 dB
Radiated disturbance above 1 GHz	1GHz ~ 40GHz	± 4.8 dB

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6. Equipment under Test

6.1. Description of EUT

Product	Cable Gateway	
Model Name	CBV390SL5-X57	
Series Model	Infinity 601	
Operating Frequency	5180 ~ 5240 MHz, 5260 ~ 5320 MHz, 5500 ~ 5700 MHz, 5745 ~ 5825 MHz	
Modulation	1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK	
Transfer Rate	802.11a: up to 54 Mbps 802.11n: up to MCS23 802.11ac: up to MCS9 802.11ax: up to MCS11	
Number of Channel	5180 ~ 5240 MHz	4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20)
		2 for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40)
		1 for 802.11ac (VHT80), 802.11ax (HE80)
	5260 ~ 5320 MHz	4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20)
		2 for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40)
		1 for 802.11ac (VHT80), 802.11ax (HE80)
		1 for 802.11ac (VHT160), 802.11ax (HE160)
	5500 ~ 5720 MHz	4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20)
		2 for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40)
		1 for 802.11ac (VHT80), 802.11ax (HE80)
		1 for 802.11ac (VHT160), 802.11ax (HE160)
	5745 ~ 5825 MHz	4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20)
2 for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40)		
1 for 802.11ac (VHT80), 802.11ax (HE80)		

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Maximum Output Power	Non-Beamforming mode: 5180 ~ 5240 MHz: 26.59 dBm 5260 ~ 5320 MHz: 23.49 dBm 5500 ~ 5700 MHz: 20.23 dBm 5745 ~ 5825 MHz: 19.17 dBm Beamforming mode: 5180 ~ 5240 MHz: 25.67 dBm 5260 ~ 5320 MHz: 19.40 dBm 5500 ~ 5700 MHz: 19.47 dBm 5745 ~ 5825 MHz: 19.17 dBm
Normal Voltage	120Vac/ 60Hz From AC adapter
Sample ID	Conducted Test: 5666280 Radiated Test: 5666280

Note:

- The models difference table as below:

Model	Wi-Fi	2.5G port	1G port	USB port	ON/OFF switch	Power adapter	Housing
CBV390SL5-X57	V	V	V	V	V	12Vdc/3.5A	black F61 housing
Infinity 601	V	V	V	X	X	12Vdc/3A	white/black F65 housing

Note: The EUT has two types of housing: black F61 housing and white/black F65 housing. Since the differences in housing are only the openings and color. These differences do not affect the test, so the test report only uses the black F61 housing as a representative.

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

Modulation Mode	Tx,Rx Function
802.11a	1Tx Fixed Chain 0,4RX
802.11n (HT20)	4TX,4RX
802.11n (HT40)	4TX,4RX
802.11ac (VHT20)	4TX,4RX
802.11ac (VHT40)	4TX,4RX
802.11ac (VHT80)	4TX,4RX
802.11ax (HE20)	4TX,4RX
802.11ax (HE40)	4TX,4RX
802.11ax (HE80)	4TX,4RX
802.11ax (HE160)	4TX,4RX

* The modulation and bandwidth are similar for 802.11n mode for HT20 / HT40 and 802.11ac mode for VHT20 / VHT40 / VHT80 and 802.11ax mode for HE20 / HE40 / HE80 / HE160, therefore investigated worst case to representative mode in test report.

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3. The EUT contains following accessory devices

Product	Brand	Model	Description
Lan Cable	EEK SONG ELEC	PF01-C112	YELLOW / 1M
AC Adapter	MOSO	MSS- V3500WR120- 042A0-US	12Vdc/3.5A
AC Adapter	MOSO	MS-V3000R120- 036I1-US	12Vdc/3A
AC Adapter	SUNNY	SYS1666-3612- W2	12Vdc/3A

4. The above EUT information is declared by manufacturer and for more detailed features description, please refer the manufacturer's or user's manual, the laboratory shall not be held responsible.

6.2. Channel List

FOR 5180 ~ 5240MHz

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20):

Channel	Frequency	Channel	Frequency
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40):

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (VHT80), 802.11ax (HE80):

Channel	Frequency
42	5210MHz

FOR 5260 ~ 5320MHz

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20):

Channel	Frequency	Channel	Frequency
52	5260 MHz	60	5300 MHz
56	5280 MHz	64	5320 MHz

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40):

Channel	Frequency	Channel	Frequency
54	5270 MHz	62	5310 MHz

1 channel is provided for 802.11ac (VHT80), 802.11ax (HE80):

Channel	Frequency
58	5290MHz

1 channel is provided for 802.11ax (HE160):

Channel	Frequency
50	5250MHz

FOR 5500 ~ 5720MHz

12 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20):

Channel	Frequency	Channel	Frequency
100	5500 MHz	124	5620 MHz
104	5520 MHz	128	5640 MHz
108	5540 MHz	132	5660 MHz
112	5560 MHz	136	5680 MHz
116	5580 MHz	140	5700 MHz
120	5600 MHz	144	5720 MHz

6 channels are provided for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40):

Channel	Frequency	Channel	Frequency
102	5510 MHz	126	5630 MHz
110	5550 MHz	134	5670 MHz
118	5590 MHz	142	5710 MHz

3 channels are provided for 802.11ac (VHT80), 802.11ax (HE80):

Channel	Frequency	Channel	Frequency
106	5530MHz	138	5690MHz
122	5610MHz	-	-

1 channel is provided for 802.11ac (VHT160), 802.11ax (HE160):

Channel	Frequency
114	5570MHz

FOR 5745 ~ 5825MHz:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20):

Channel	Frequency	Channel	Frequency
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz	-	-

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40):

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (VHT80), 802.11ax (HE80):

Channel	Frequency
155	5775MHz

6.3. Test Condition

Test Item	Test Site No.	Environmental Condition	Input Power	Test Date	Tested by
Antenna Port Conducted Measurement	SR4	22~24°C/ 63~65%RH	120Vac/ 60Hz	2023/03/21~ 2023/04/12	WaterNil Guan
Radiated Spurious Emission	966-2	20~26°C/ 60~66%RH	120Vac/ 60Hz	2023/01/30~ 2023/04/12	WaterNil Guan
AC power Line Conducted Emission	SR1	22~24°C/ 63~65%RH	120Vac/ 60Hz	2023/03/21~ 2023/03/27	WaterNil Guan

FCC Test Firm Registration Number: 498077

Sample Calculation:

Antenna Port Conducted Measurement:

- Where relevant, the follow sample calculation is provided:
 Result Value (dBm) = Reading Value (dBm) +Attenuator Factor (dB) + Cable Loss (dB).
 Example: Result Value (10dBm) = Reading Value (-2dBm) +Attenuator Factor (10dB) + Cable Loss(2dB).
 *Test plot only shown the “Result Value”.

Radiated Spurious Emission:

- Where relevant, the follow sample calculation is provided:
 Result Value (dBuV/m) = Reading Value (dBuV) + Correction Factor (dB/m).
 Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB) - Preamp Factor (dB).
 Example: Result Value (34.5dBuV/m) = Reading Value (40.1dBuV) + Antenna Factor (18.7dB/m) + Cable Loss (4.2dB) - Preamp Factor (28.5dB).

AC power Line Conducted Emission:

- Where relevant, the follow sample calculation is provided:
 Result Value (dBuV) = Reading Value (dBuV) + Correction Factor (dB).
 Correction Factor (dB) = Insertion loss(dB) + Cable loss(dB).
 Example: Result Value (53.7dBuV) = Reading Value (35.1dBuV) + Insertion loss(18.1dB) + Cable loss(0.5dB).

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6.4. Description of Available Antennas

Ant. No.	Transmitter Circuit	Brand Name	Model Name	Ant. Type	Maximum Gain (dBi)
1	Chain (0)	LYNWAVE TECH	2AN-C901WE00RFR	PCB	2.4GHz: 3.5 5GHz: 3.9
2	Chain (1)	LYNWAVE TECH	2AN-C901BK00RFR	PCB	2.4GHz: 3.5 5GHz: 4.6
3	Chain (2)	LYNWAVE TECH	2AN-C901BE00RFR	PCB	2.4GHz: 3.6 5GHz: 5.1
4	Chain (3)	LYNWAVE TECH	2AN-C901GY00RFR	PCB	5GHz: 3.2

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, the laboratory shall not be held responsible.

6.5. Test Mode Applicability and Tested Channel Detail

- The fundamental of the EUT was investigated in three orthogonal axes X-Y/Y-Z/X-Z, it was determined that X-Y plane was worst-case. Therefore, all final radiated testing was performed with the EUT in X-Y plane.
- 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	5180-5240	OFDM	36 to 48	36, 44, 48	6Mbps
	802.11ax20		OFDM/OFDMA	36 to 48	36, 44, 48	MCS 0
	802.11ax40			38 to 46	38, 46	MCS 0
	802.11ax80			42	42	MCS 0
	802.11a	5260-5320	OFDM	52 to 64	52, 60, 64	6Mbps
	802.11ax20		OFDM/OFDMA	52 to 64	52, 60, 64	MCS 0
	802.11ax40			54 to 62	54, 62	MCS 0
	802.11ax80			58	58	MCS 0
	802.11ax160	50		50	MCS 0	
	802.11a	5500-5720	OFDM	100 to 144	100, 116, 140, 144	6Mbps
	802.11ax20		OFDM/OFDMA	100 to 144	100, 116, 140, 144	MCS 0
	802.11ax40			102 to 142	102, 110, 134, 142	MCS 0
	802.11ax80			106, 122, 138	106, 122, 138	MCS 0
	802.11ax160			114	114	MCS 0
	802.11a	5745-5825	OFDM	149 to 165	149, 157, 165	6Mbps
	802.11ax20		OFDM/OFDMA	149 to 165	149, 157, 165	MCS 0
	802.11ax40			151 to 159	151, 159	MCS 0
	802.11ax80			155	155	MCS 0

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Test Item	Mode	Modulation Technology	Modulation Type	Available Channel	Test Channel	Data Rate
Radiated Emissions (Below 1GHz)	802.11ax20	5250-5260	OFDM	36 to 48	44	MCS 0
AC Power Line Conducted Emission	802.11ax20	5250-5260	OFDM	36 to 48	44	MCS 0
Antenna Port Conducted Measurement	802.11a	5180-5240	OFDM	36 to 48	36, 44, 48	6Mbps
	802.11ax20		OFDM/OFDMA	36 to 48	36, 44, 48	MCS 0
	802.11ax40			38 to 46	38, 46	MCS 0
	802.11ax80			42	42	MCS 0
	802.11a	5260-5320		OFDM	52 to 64	52, 60, 64
	802.11ax20		OFDM/OFDMA	52 to 64	52, 60, 64	MCS 0
	802.11ax40			54 to 62	54, 62	MCS 0
	802.11ax80			58	58	MCS 0
	802.11ax160	50		50	MCS 0	
	802.11a	5500-5720	OFDM	100 to 144	100, 116, 140, 144	6Mbps
	802.11ax20		OFDM/OFDMA	100 to 144	100, 116, 140, 144	MCS 0
	802.11ax40			102 to 142	102, 110, 134, 142	MCS 0
	802.11ax80			106, 122, 138	106, 122, 138	MCS 0
	802.11ax160			114	114	MCS 0
	802.11a	5745-5825		OFDM	149 to 165	149, 157, 165
	802.11ax20		OFDM/OFDMA	149 to 165	149, 157, 165	MCS 0
	802.11ax40			151 to 159	151, 159	MCS 0
	802.11ax80			155	155	MCS 0

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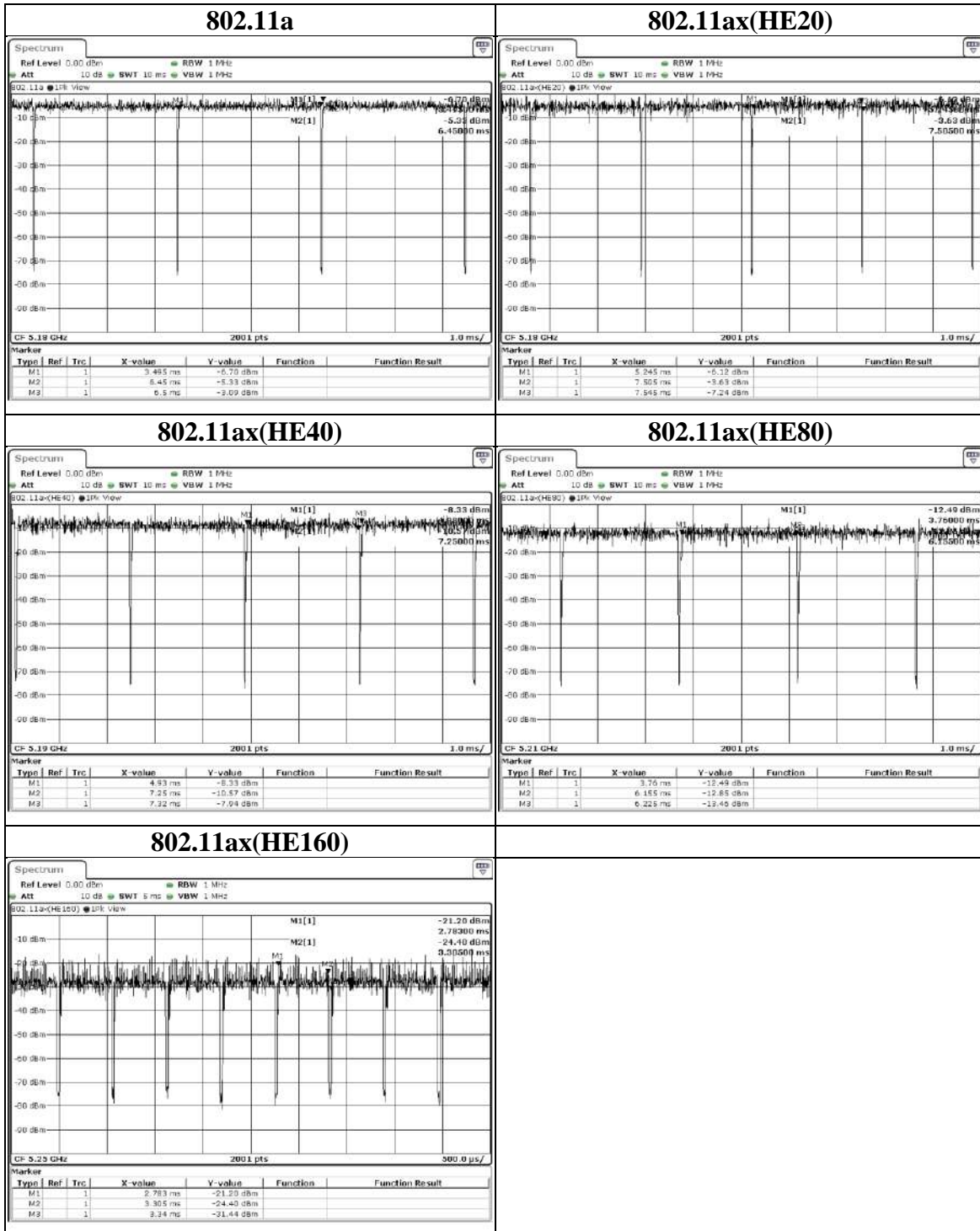
Beamforming mode:

Test Item	Mode	Modulation Technology	Modulation Type	Available Channel	Test Channel	Data Rate
Antenna Port Conducted Measurement	802.11ax20	5180-5240	OFDM/OFDMA	36 to 48	36, 44, 48	HE0
	802.11ax40			38 to 46	38, 46	HE0
	802.11ax80			42	42	HE0
	802.11ax20	5260-5320	OFDM/OFDMA	52 to 64	52, 60, 64	HE0
	802.11ax40			54 to 62	54, 62	HE0
	802.11ax80			58	58	HE0
	802.11ax160			50	50	HE0
	802.11ax20	5500-5720	OFDM/OFDMA	100 to 144	100, 116, 140, 144	HE0
	802.11ax40			102 to 142	102, 110, 134, 142	HE0
	802.11ax80			106, 122, 138	106, 122, 138	HE0
	802.11ax160			114	114	HE0
	802.11ax20	5745-5825	OFDM/OFDMA	149 to 165	149, 157, 165	HE0
	802.11ax40			151 to 159	151, 159	HE0
	802.11ax80			155	155	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.

6.6. Duty cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle	Duty Factor (dB)	VBW Set (above 1GHz)
802.11a	2.955	3.005	0.9834	N/A	10Hz
802.11ax(HE 20)	2.260	2.300	0.9826	N/A	10Hz
802.11ax(HE 40)	2.320	2.390	0.9707	0.13	510Hz
802.11ax(HE 80)	2.395	2.465	0.9716	0.13	510Hz
802.11ax(HE 160)	0.522	0.557	0.9372	0.28	2kHz



7. Test Equipment

Test Equipment List					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Expired date
Radiated Spurious Emission					
Spectrum Analyzer	Keysight	N9010A	MY56070834	2022/10/24	2023/10/23
EMI Test Receiver	Rohde & Schwarz	ESR7	101754	2022/12/13	2023/12/12
Loop Antenna	ETS lindgren	6502	00213440	2023/1/4	2024/1/3
Trilog-Broadband Antenna with 5dB Attenuator	Schwarzbeck & EMCI	VULB 9168 & N-6-05	774 & AT-N0538	2023/2/13	2024/2/12
Horn Antenna (1-18 GHz)	Schwarzbeck	BBHA 9120 D	01690	2022/12/21	2023/12/20
Horn Antenna (18-40 GHz)	Schwarzbeck	BBHA 9170	781	2022/12/30	2023/12/29
Preamplifier (30-1000 MHz)	EMCI	EMC330E	980405	2022/6/7	2023/6/6
Preamplifier (1-18 GHz)	EMCI	EMC051835BE	980406	2023/2/17	2024/2/16
Preamplifier (18-40GHz)	EMCI	EMC184040SEE	980426	2022/5/17	2023/5/16
Cables	Hanyitek	K1K50-UP0264-K1K50-2500	170214-4 & 170425-2	2022/12/1	2023/11/30
Cables	Hanyitek	K1K50-UP0264-K1K50-2500	170214-1 & 170214-2	2022/12/1	2023/11/30

Test Equipment List					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Expired date
Antenna Port Conducted Measurement					
Spectrum Analyzer	Keysight	N9010A	MY56070834	2022/10/24	2023/10/23
Attenuator	EMCI	EMC-40ATK2W10	17002	2022/12/9	2023/12/8
USB Power Sensor	Anritsu	MA24408A	12031	2022/6/22	2023/6/21
Temperature & Humidity Test Chamber	GIANT FORCE	GTH-150-40-CP-AR	MAA1701-010	2023/3/8	2024/3/7
AC power Line Conducted Emission					
EMI Test Receiver	Rohde & Schwarz	ESR7	101753	2022/11/10	2023/11/9
Two-Line V-Network	Rohde & Schwarz	ENV216	102136	2022/8/29	2023/8/28
Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	2022/8/30	2023/8/29
Cables	TITAN	CFD200	T0732ACFD200 20A300-2	2022/4/9	2023/4/8

UL Software		
Description	Name	Version
Radiated measurement	e3	6.191211 (V6)
Conducted measurement	RF-Conducted-FCC 15407	ver 1.1
AC power Line Conducted Emission	EZ_EMG	UL-3A1.2

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Doc No: Form-ULID-004739 (DCS:17-EM-F0878) / 6.1

8. Description of Test Setup

Support Equipment

ID	Equipment	Brand Name	Model Name	S/N	Remark
A	Laptop	DELL	Latitude E5470	CXSKWF2	Provide by lab
B	Adapter	Moso	MSS- V3500WR120- 042A0-US	N/A	Provide by Client
C	USB Flash	Transcend	JetFlash 700	N/A	Provide by lab
D	Hub	D-Link	DES-1005A	TES1005AE1E	Provide by lab
E	Phone	SAMPO	HT-B1003L	993706277	Provide by lab
F	Phone	SAMPO	HT-B1003L	993706278	Provide by lab

I/O Cables

ID	Equipment	Brand Name	Model Name	Length (m)	Remark
1	Lan Cable	EEK SONG ELEC	PF01-C112	1	Provide by Client
2	RJ-45 Cable	OEM/AngNet	UTP	2	Provide by lab
3	RJ-45 Cable	OEM/AngNet	UTP	2	Number x 3 Provide by lab
4	RJ-45 Cable	Fastlink	FL-61STU-04	10	Provide by lab
5	Coaxial Cable	TBD	TBD	2.5	Provide by lab
6	RJ-11 Cable	Tupavco	PW01	10	Provide by lab
7	RJ-11 Cable	Tupavco	PW01	10	Provide by lab

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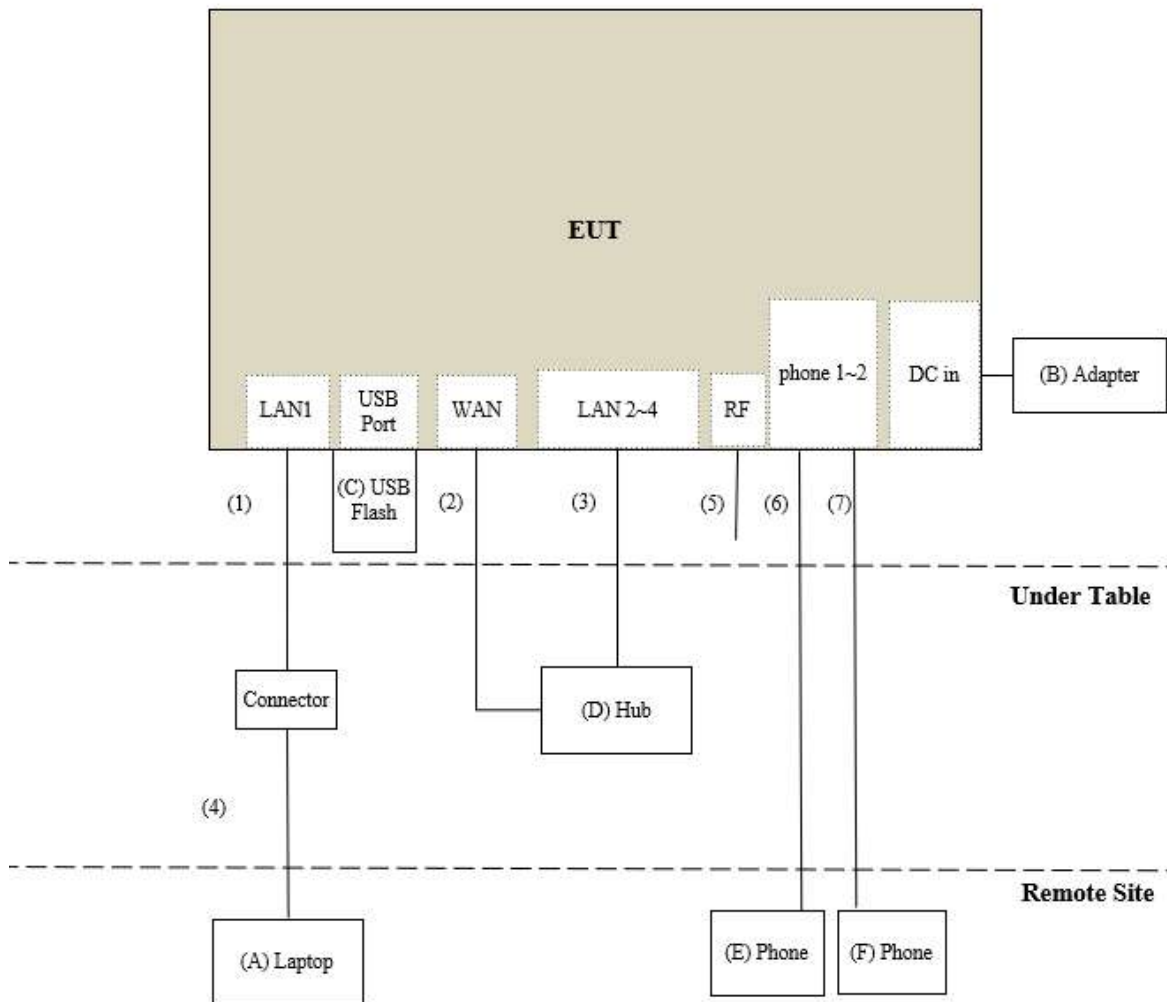
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Test Setup

Controlled using a bespoke application (Access Manual Tool_version 3.1.0.1) 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.

Setup Diagram for Test



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9. Test Results

9.1. 6dB Bandwidth

Requirements

The minimum 6 dB bandwidth shall be at least 500 kHz.

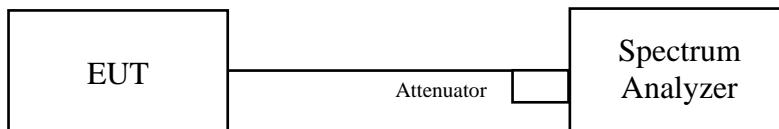
Test procedure

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

Note:

- Straddle Channel Bandwidth below 5725MHz = Delta 2 – Delta 4.
- Straddle Channel Bandwidth above 5725MHz = Delta 4 (marked on the 5745MHz).

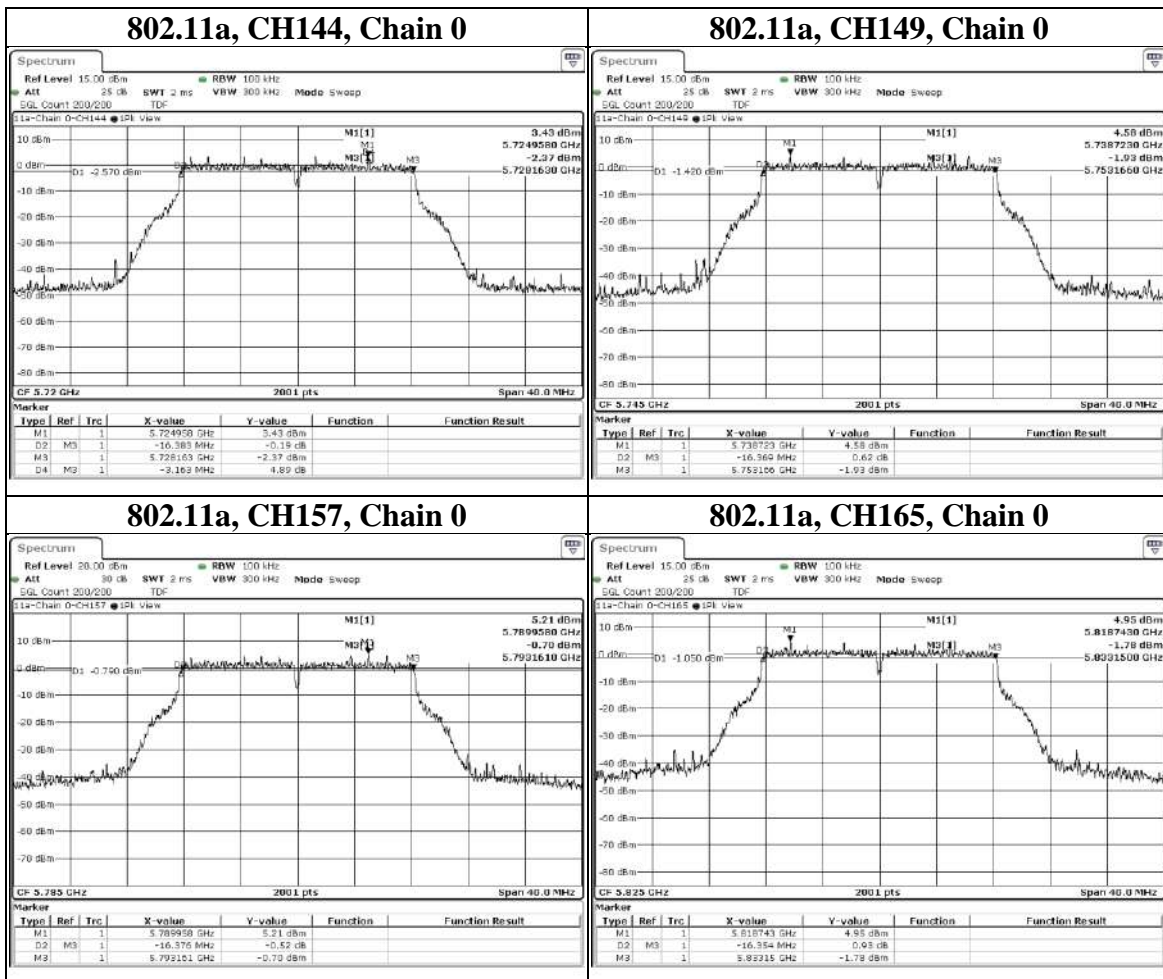
Test Setup



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

Test Data

Mode	CH	Freq (MHz)	6dB BW (MHz)	Limit (MHz)	Result
			Chain 0		
802.11a	144 (U-NII-2C)	5720	13.22	0.5	PASS
	144 (U-NII-2C+U-NII-3)	5720	16.383	0.5	PASS
	144 (U-NII-3)	5720	3.163	0.5	PASS
	149	5745	16.369	0.5	PASS
	157	5785	16.376	0.5	PASS
	165	5825	16.354	0.5	PASS



Mode	CH	Freq (MHz)	6dB BW (MHz)				Limit (MHz)	Result
			Chain 0	Chain 1	Chain 2	Chain 3		
802.11ax (HE20)	144 (U-NII-2C)	5720	14.51	14.526	14.525	14.549	0.5	PASS
	144 (U-NII-2C+U-NII-3)	5720	18.98	19.013	19.015	19.044	0.5	PASS
	144 (U-NII-3)	5720	4.47	4.487	4.49	4.495	0.5	PASS
	149	5745	17.612	17.599	17.625	17.61	0.5	PASS
	157	5785	18.977	18.879	18.931	18.965	0.5	PASS
	165	5825	19.011	19.043	18.994	18.912	0.5	PASS

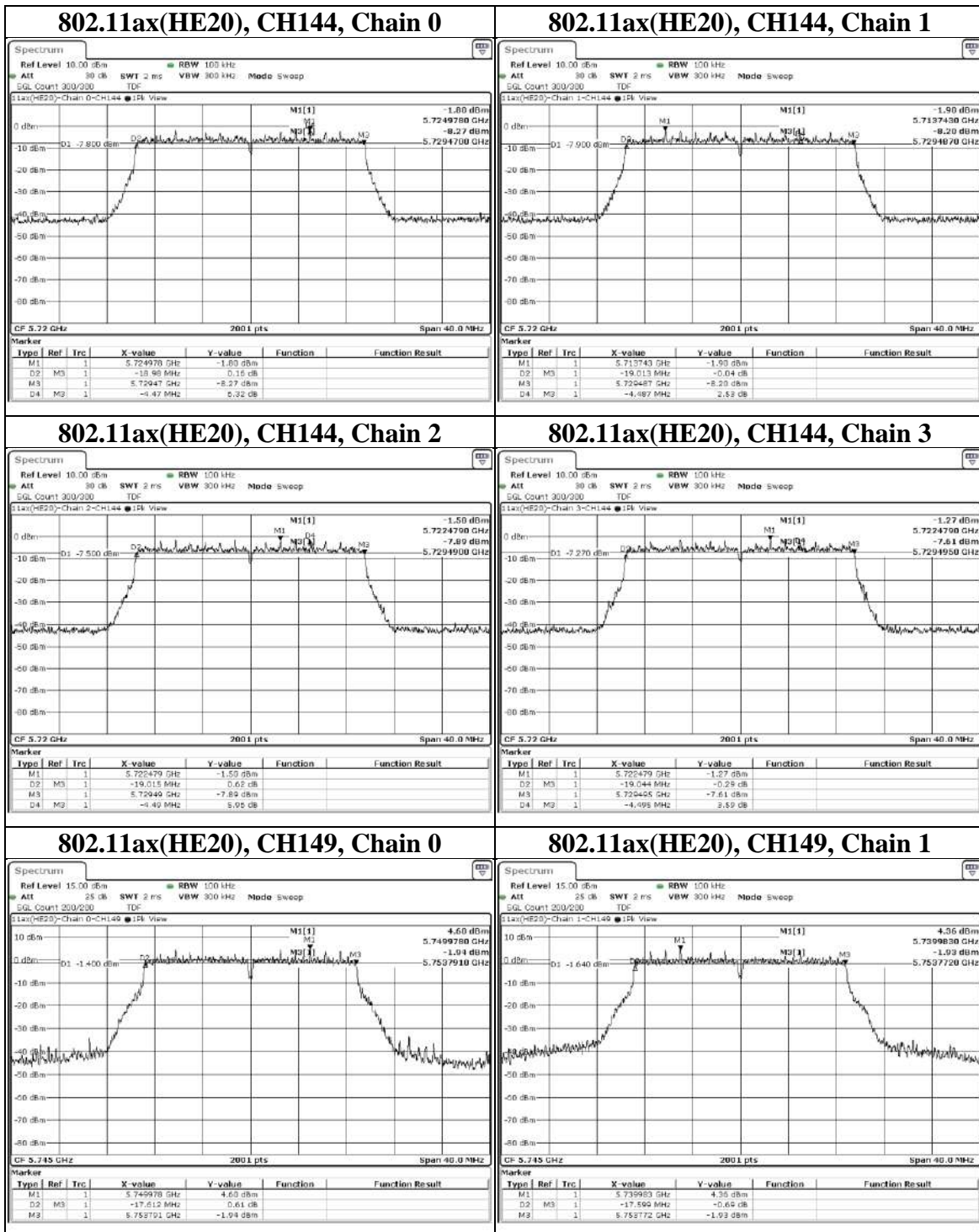
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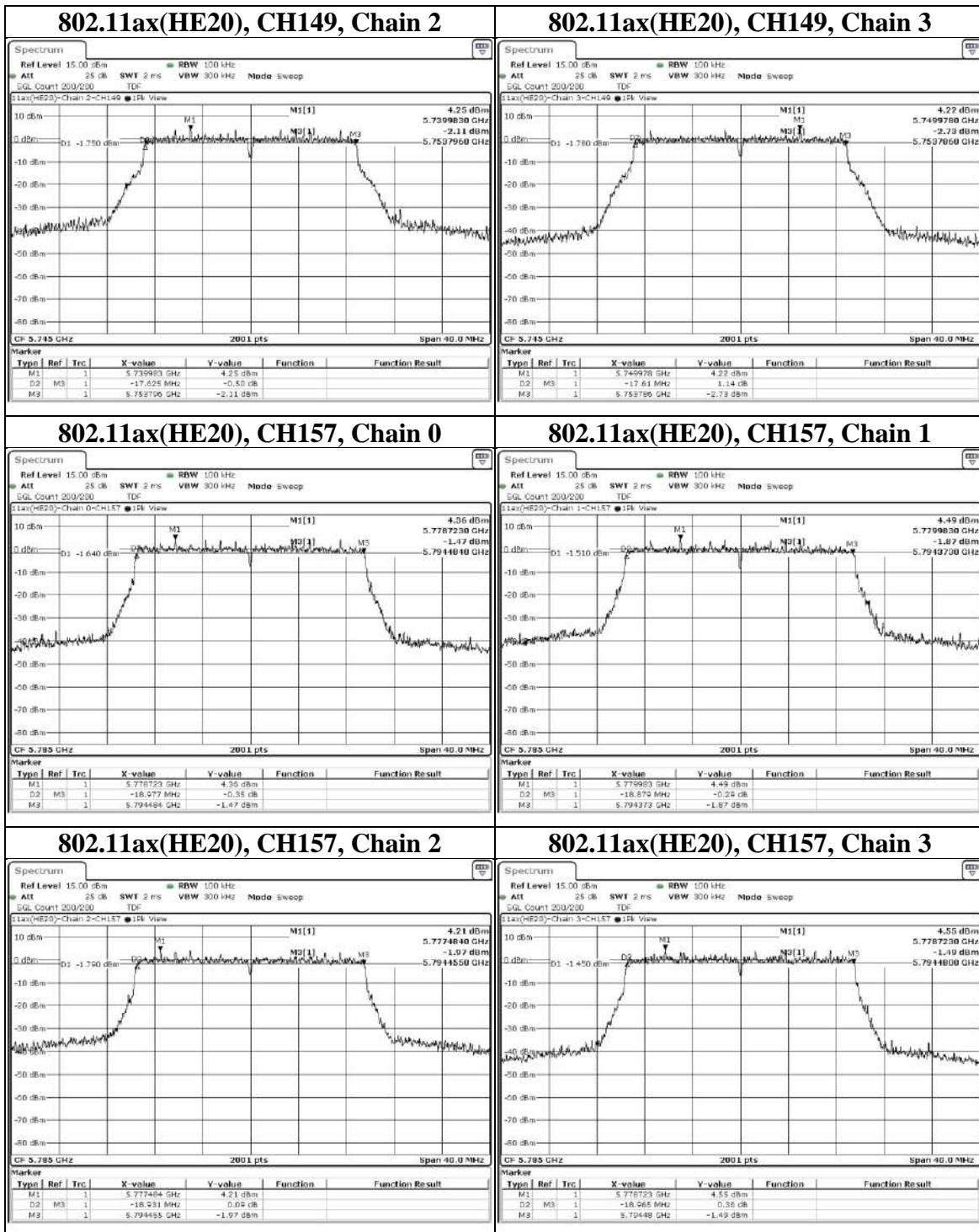
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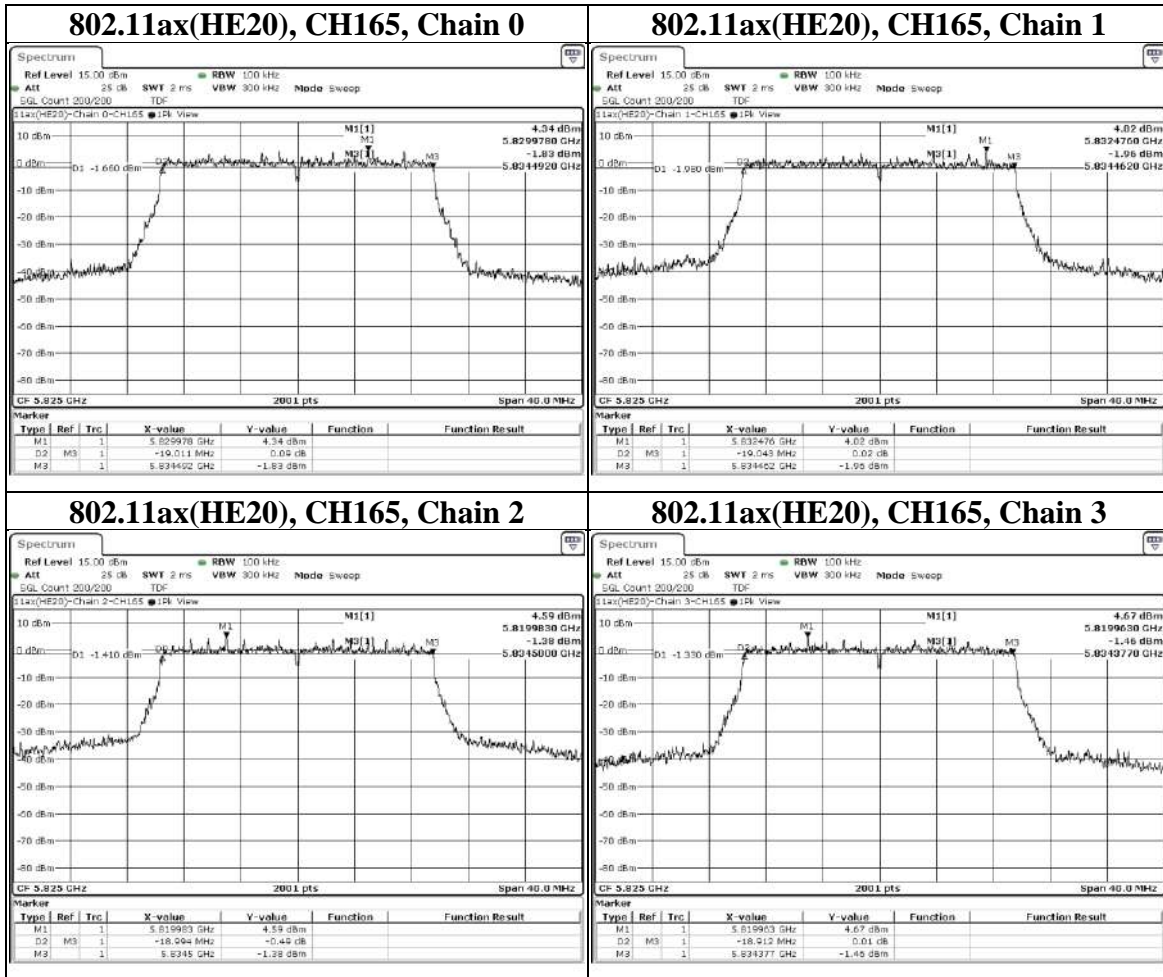
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Mode	CH	Freq (MHz)	6dB BW (MHz)				Limit (MHz)	Result
			Chain 0	Chain 1	Chain 2	Chain 3		
802.11ax (HE40)	142 (U-NII-2C)	5710	33.888	33.923	33.842	34.005	0.5	PASS
	142 (U-NII-2C+U-NII-3)	5710	37.397	37.732	37.554	37.899	0.5	PASS
	142 (U-NII-3)	5710	3.509	3.809	3.712	3.894	0.5	PASS
	151	5755	37.775	37.642	37.759	37.771	0.5	PASS
	159	5795	37.718	37.706	37.768	37.929	0.5	PASS

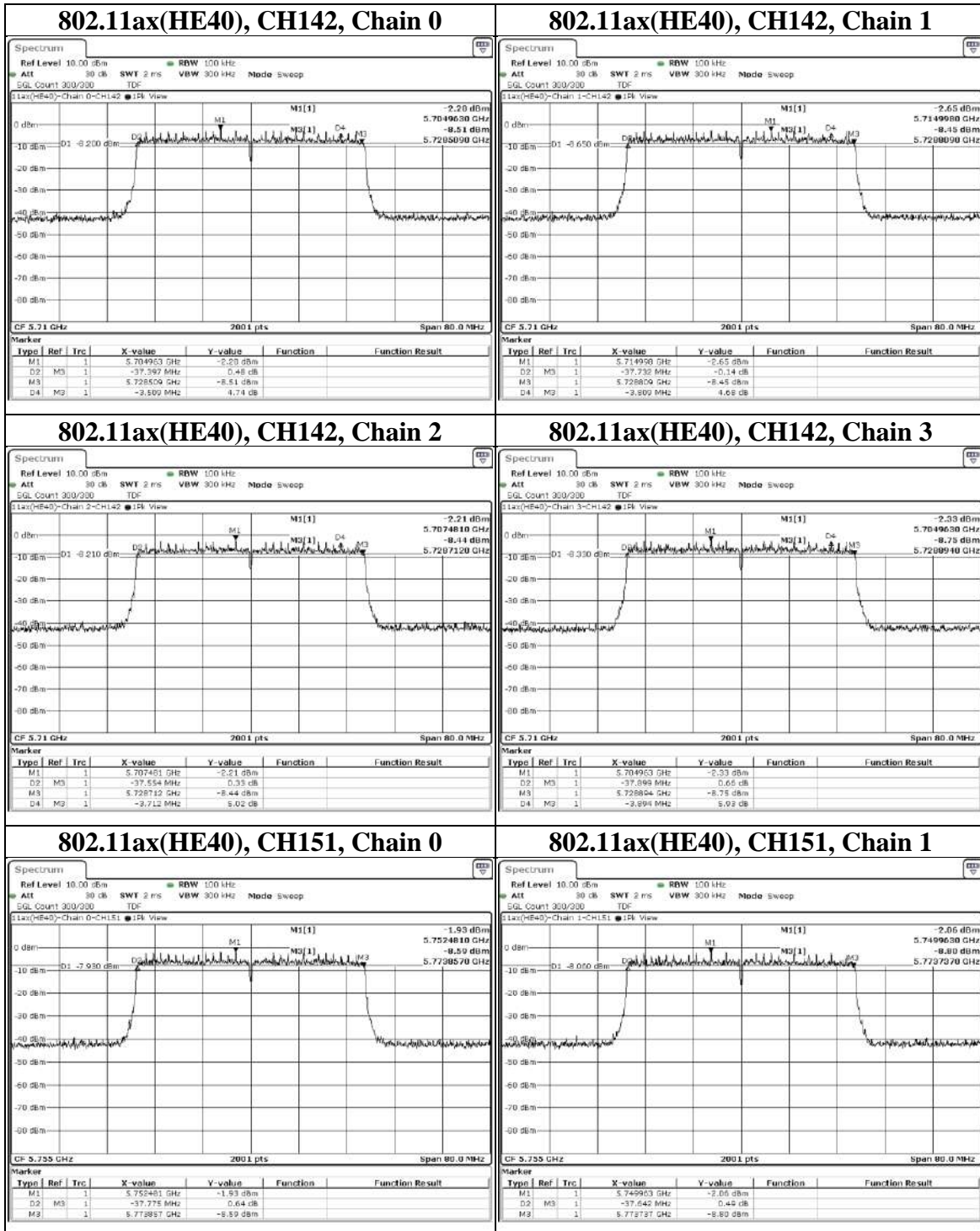
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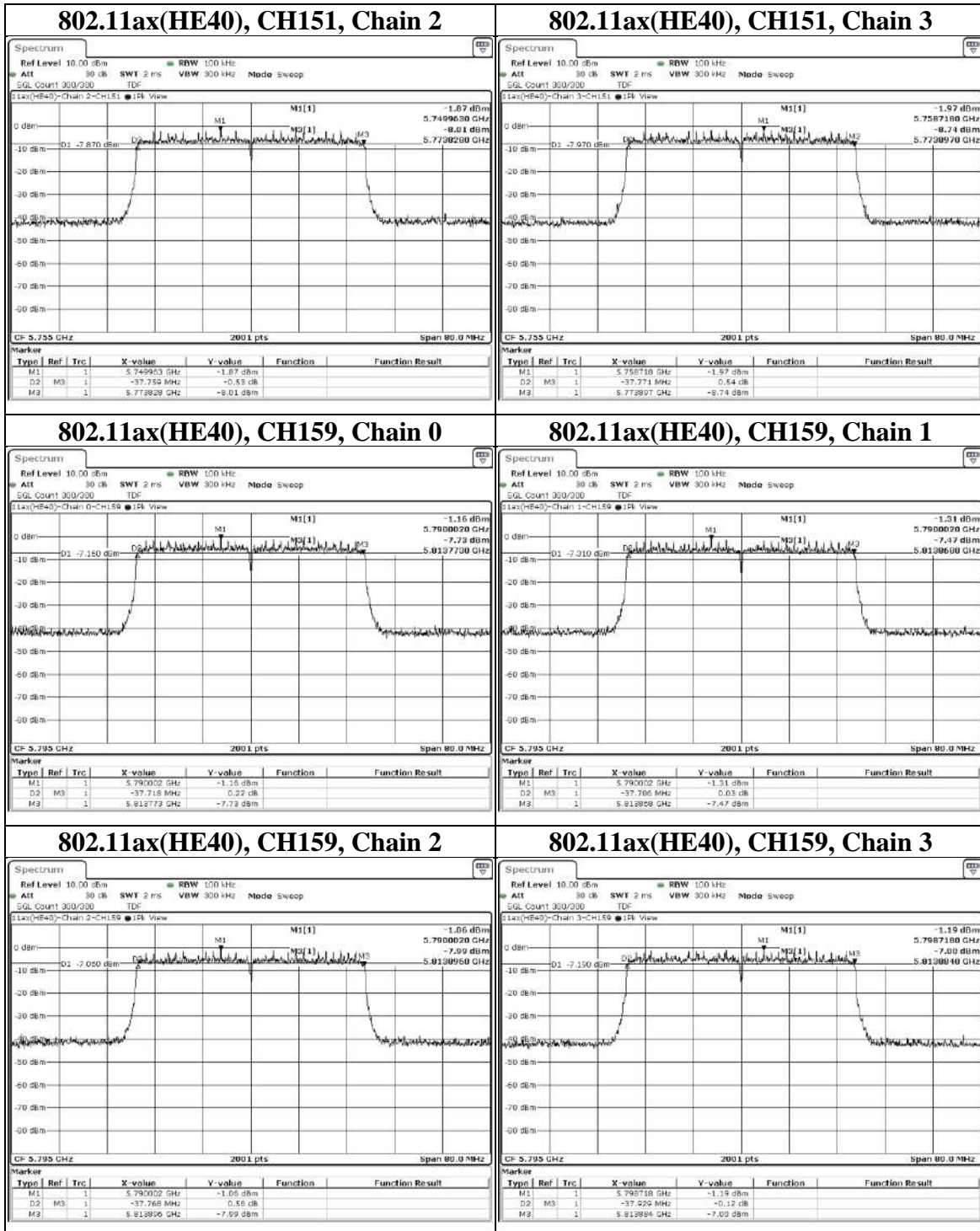
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Mode	CH	Freq (MHz)	6dB BW (MHz)				Limit (MHz)	Result
			Chain 0	Chain 1	Chain 2	Chain 3		
802.11ax (HE80)	138 (U-NII-2C)	5690	73.777	73.984	73.565	73.757	0.5	PASS
	138 (U-NII-2C+U-NII-3)	5690	77.608	77.644	77.415	77.571	0.5	PASS
	138 (U-NII-3)	5690	3.831	3.66	3.85	3.814	0.5	PASS
	155	5775	77.624	77.447	77.702	77.515	0.5	PASS

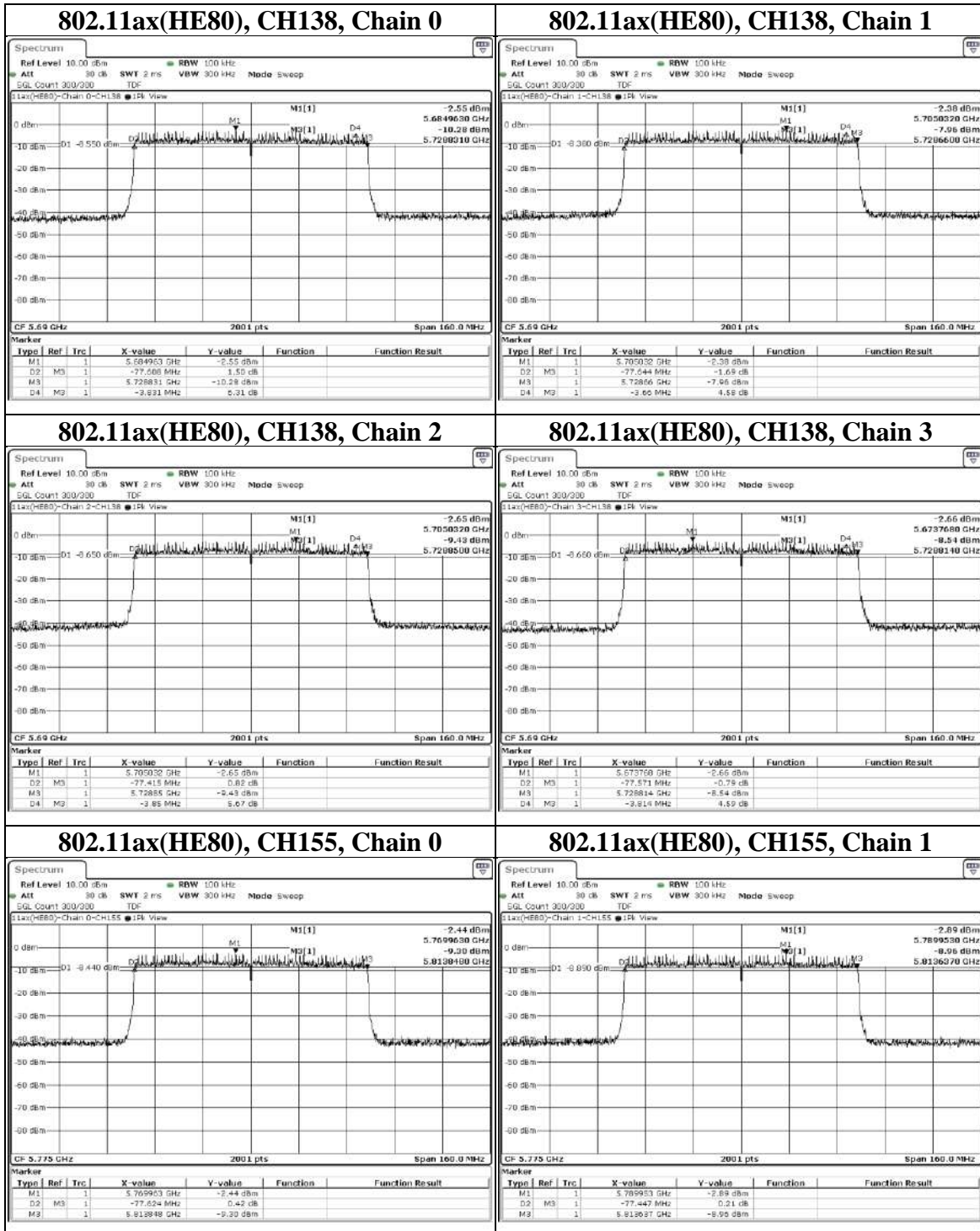
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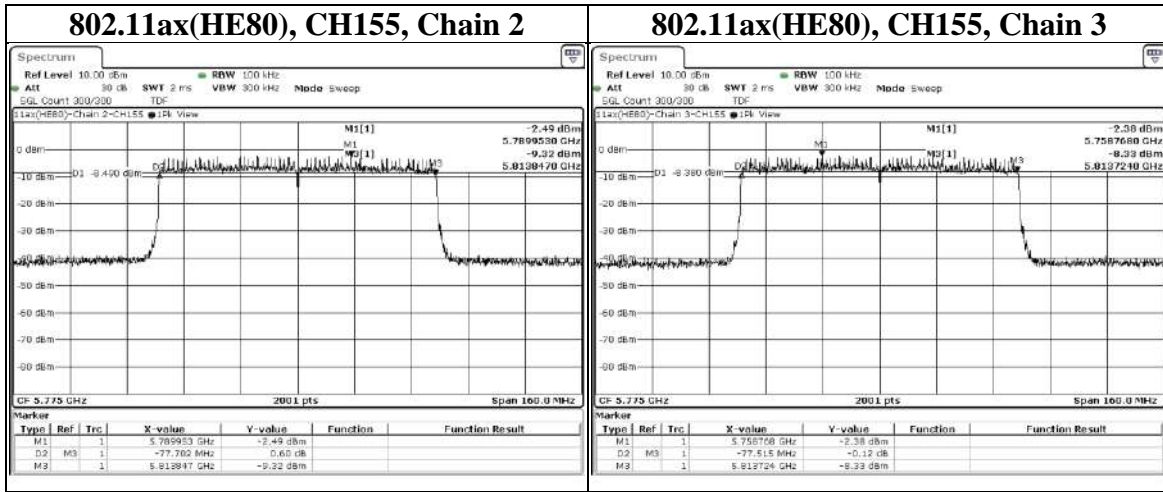
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9.2. 26dB Bandwidth

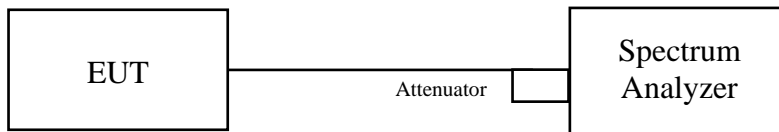
Test procedure

- a. Set RBW = approximately 1% of the emission bandwidth.
- b. Set the VBW > RBW.
- c. Detector = Peak.
- d. Trace mode = max hold.
- e. Measure the maximum width of the emission that is 26 dB down from the 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%.

Note:

1. Straddle Channel Bandwidth below 5725MHz = Delta 2 – Delta 4.
2. Straddle Channel Bandwidth above 5725MHz = Delta 4 (marked on the 5745MHz).

Test Setup



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

Test Data

Mode	CH	Freq (MHz)	26dB BW (MHz)	Limit (MHz)	Result
			Chain 0		
802.11a	36	5180	21.187	N/A	PASS
	44	5220	40.958	N/A	PASS
	48	5240	28.45	N/A	PASS
	52	5260	28.177	N/A	PASS
	60	5300	26.323	N/A	PASS
	64	5320	23.498	N/A	PASS
	100	5500	21.147	N/A	PASS
	116	5580	21.168	N/A	PASS
	140	5700	21.284	N/A	PASS
	144 (U-NII-2C)	5720	15.683	N/A	PASS
	144 (U-NII-2C+U-NII-3)	5720	21.461	N/A	PASS
	144 (U-NII-3)	5720	5.778	N/A	PASS

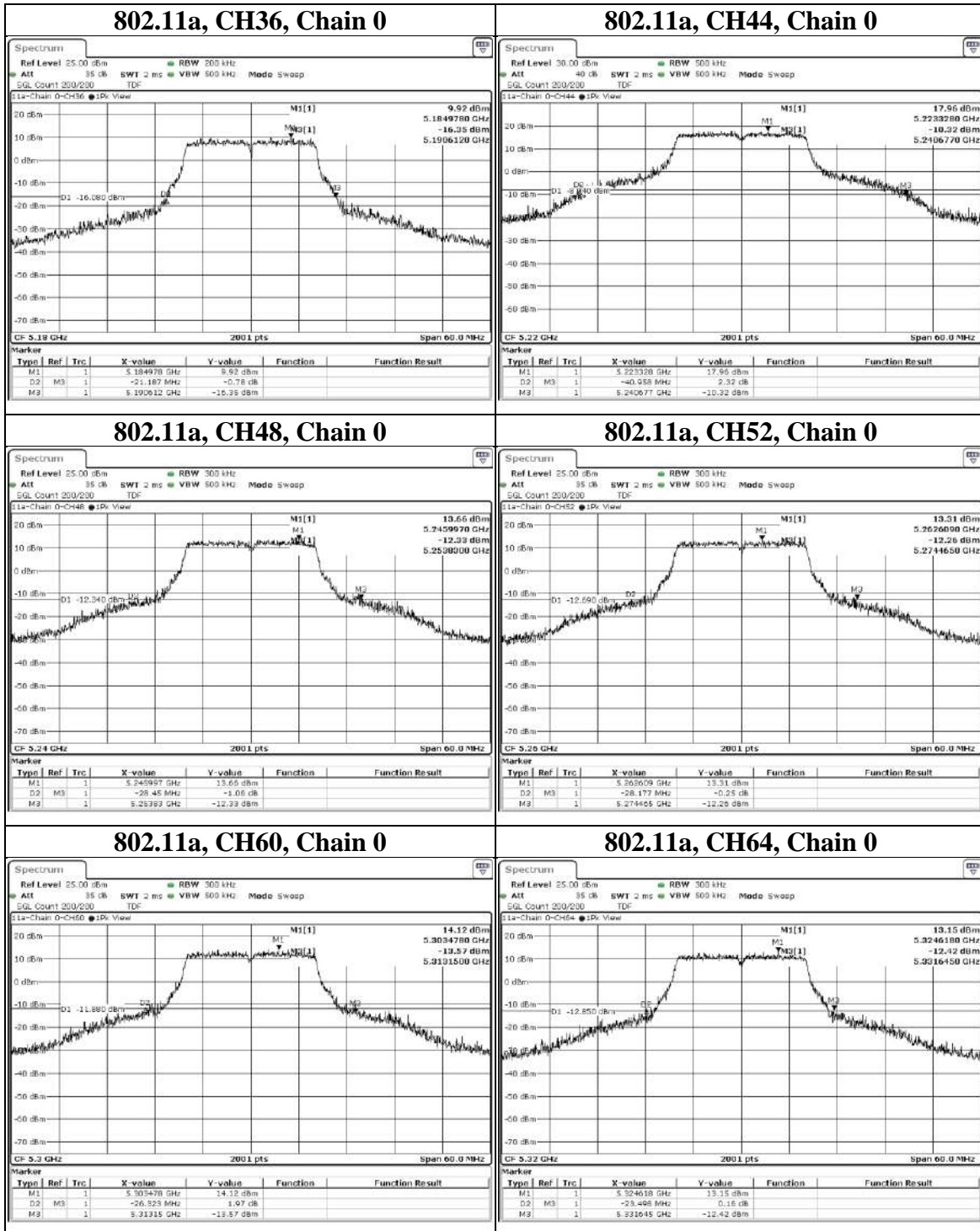
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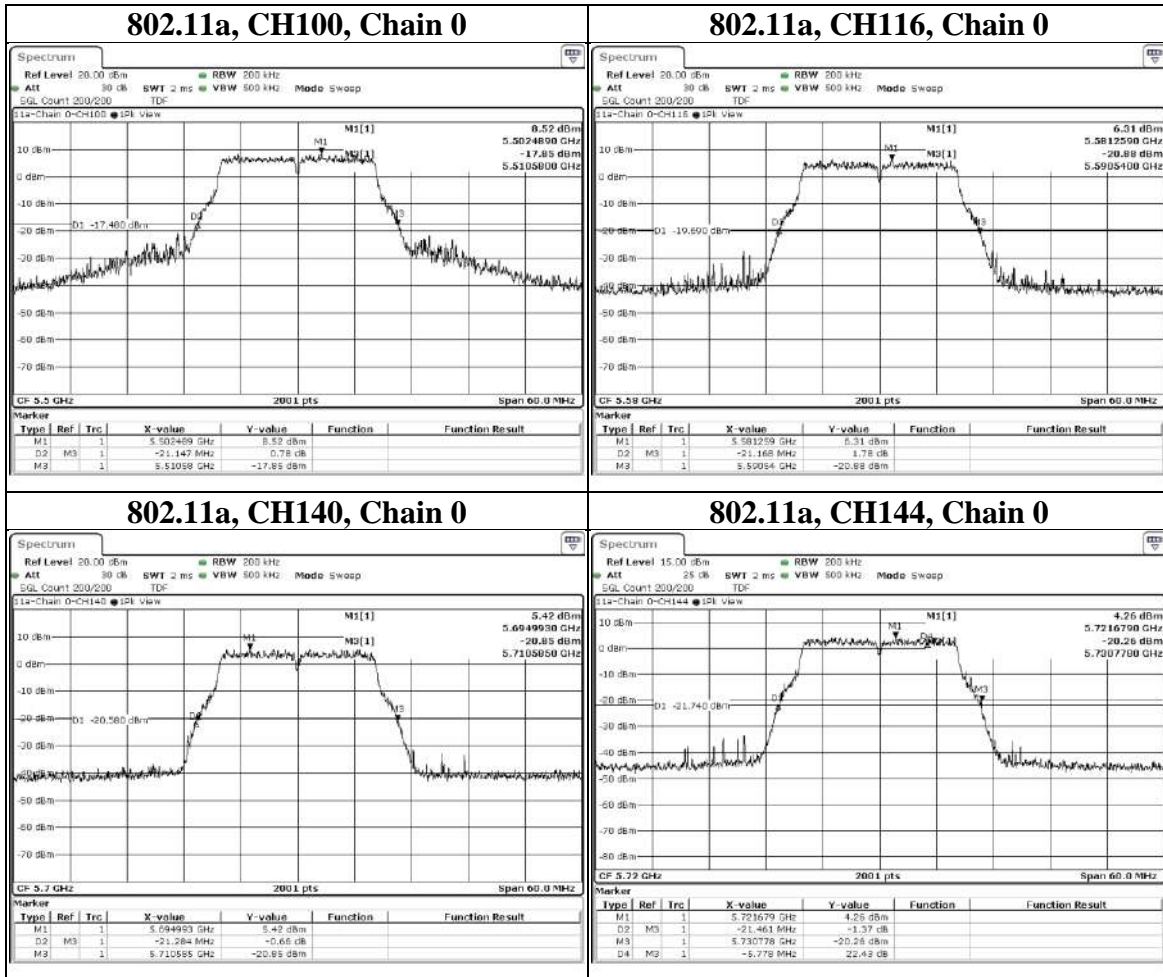
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Mode	CH	Freq (MHz)	26dB BW (MHz)				Limit (MHz)	Result
			Chain 0	Chain 1	Chain 2	Chain 3		
802.11ax (HE20)	36	5180	21.674	21.385	21.407	21.751	N/A	PASS
	44	5220	21.267	21.181	21.482	21.506	N/A	PASS
	48	5240	21.222	21.529	21.259	21.489	N/A	PASS
	52	5260	21.188	21.339	21.325	21.547	N/A	PASS
	60	5300	21.13	21.494	21.464	21.586	N/A	PASS
	64	5320	21.32	21.35	21.442	21.337	N/A	PASS
	100	5500	21.388	21.202	21.221	21.639	N/A	PASS
	116	5580	21.445	21.4	21.352	21.582	N/A	PASS
	140	5700	21.382	21.48	21.642	21.3	N/A	PASS
	144 (U-NII-2C)	5720	15.837	15.779	15.687	15.733	N/A	PASS
	144 (U-NII-2C+U-NII-3)	5720	21.607	21.581	21.45	21.514	N/A	PASS
	144 (U-NII-3)	5720	5.77	5.802	5.763	5.781	N/A	PASS

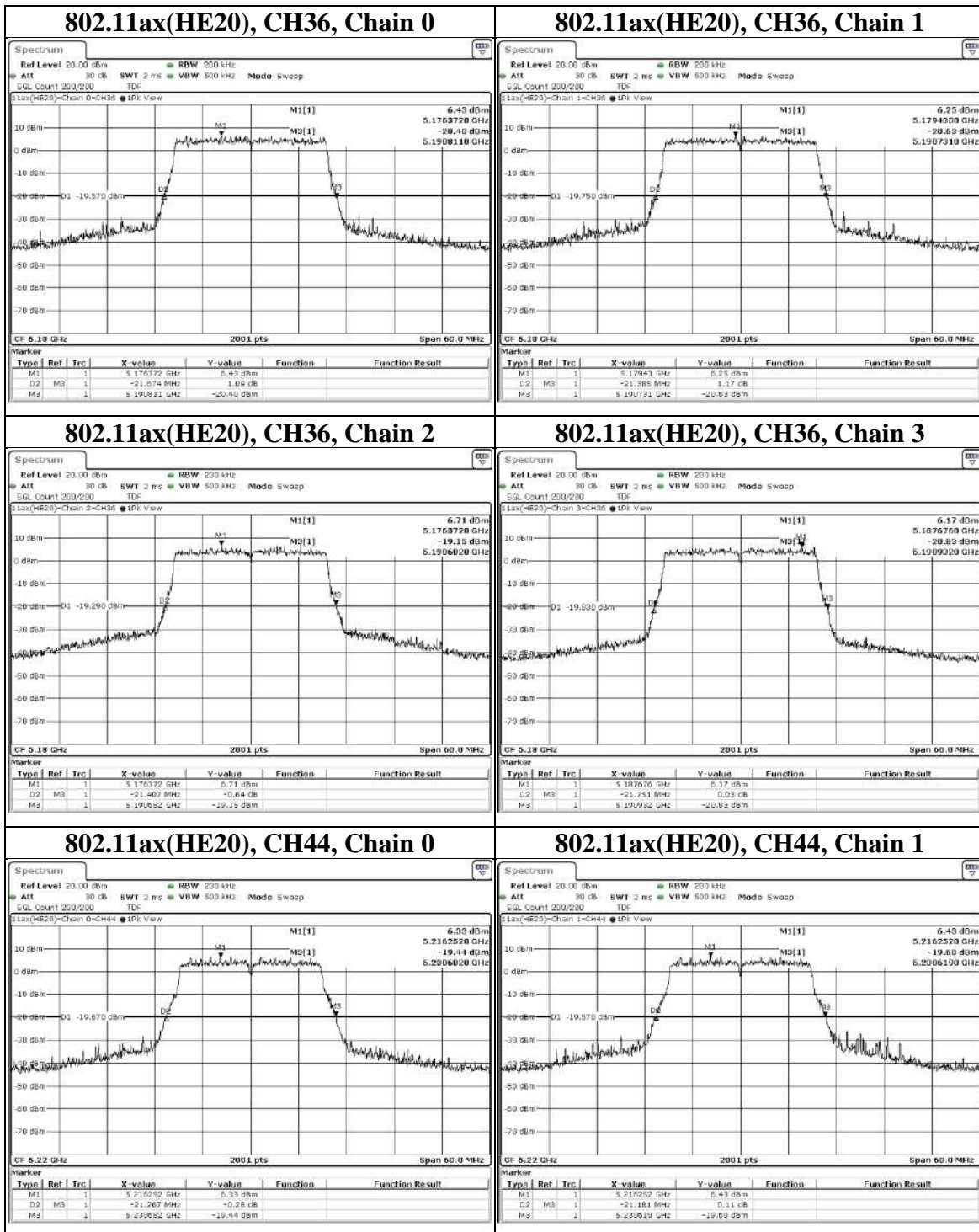
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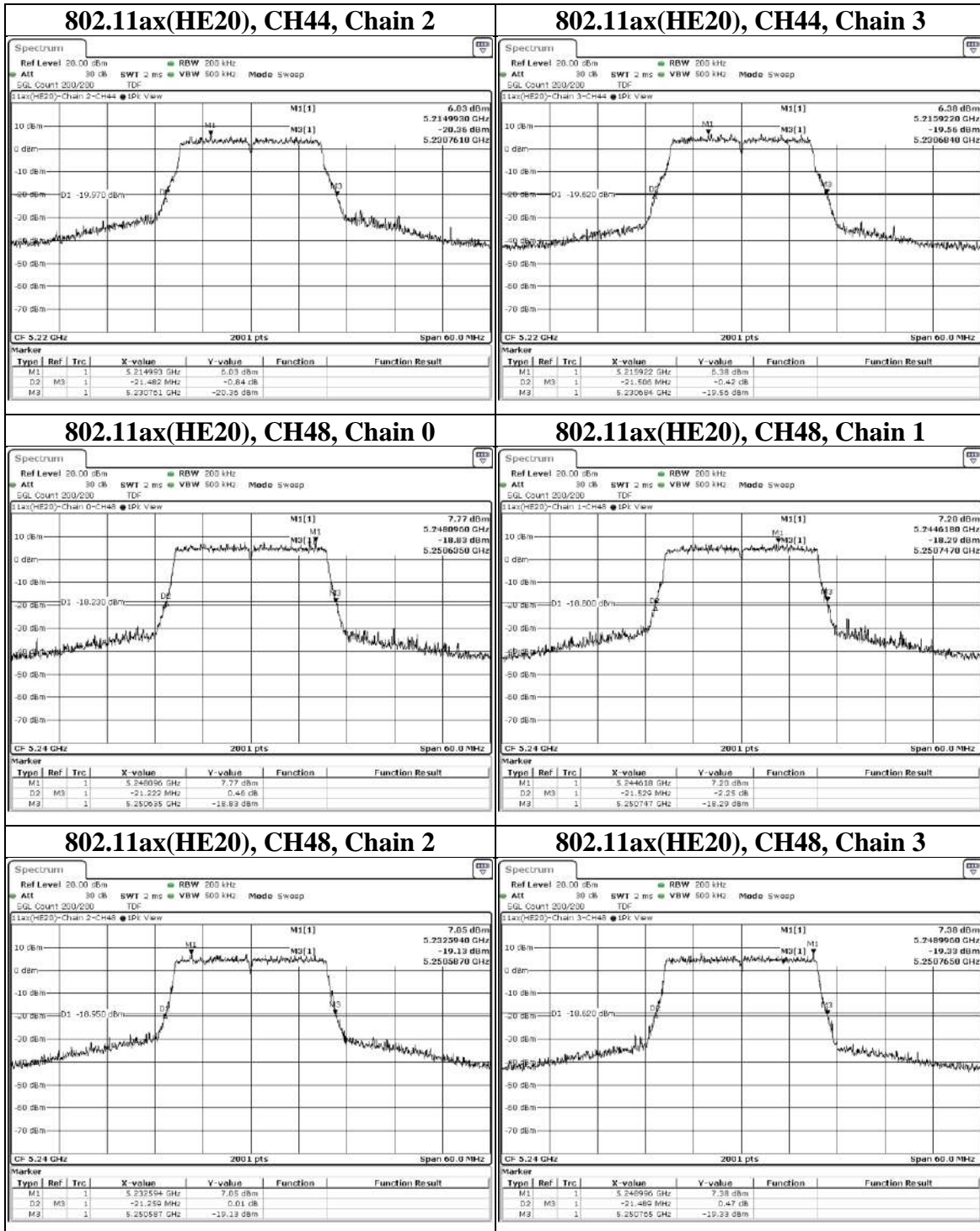
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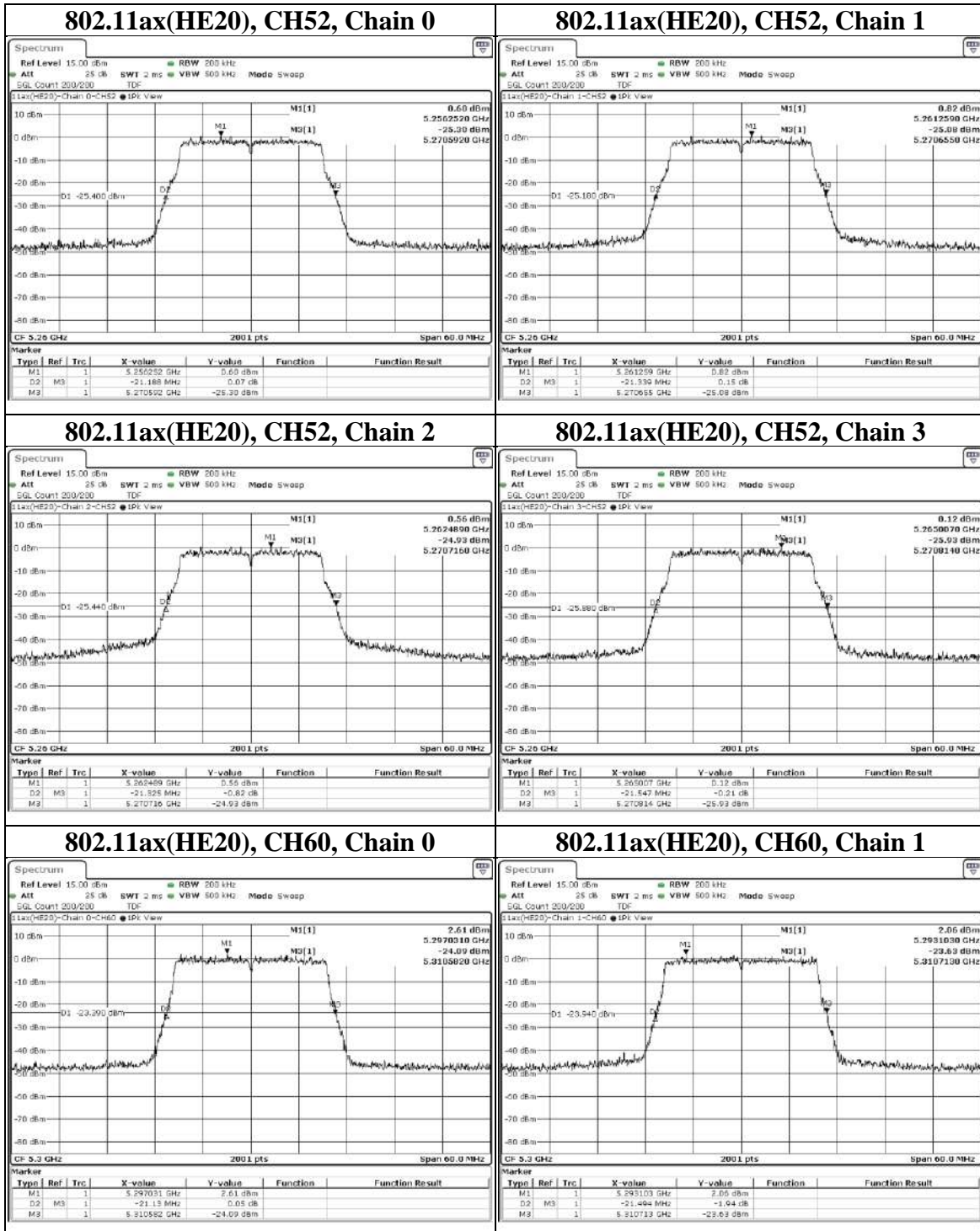
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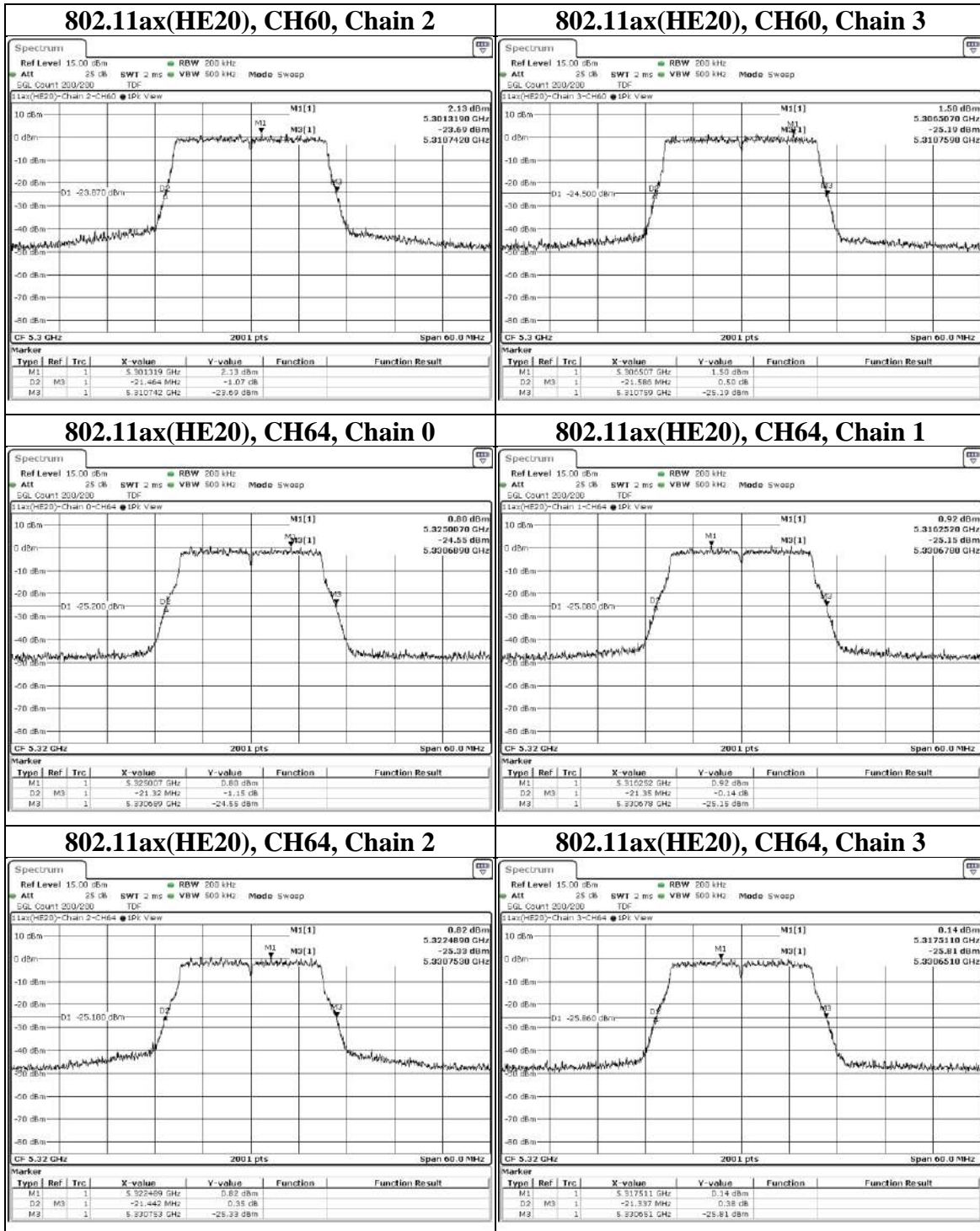
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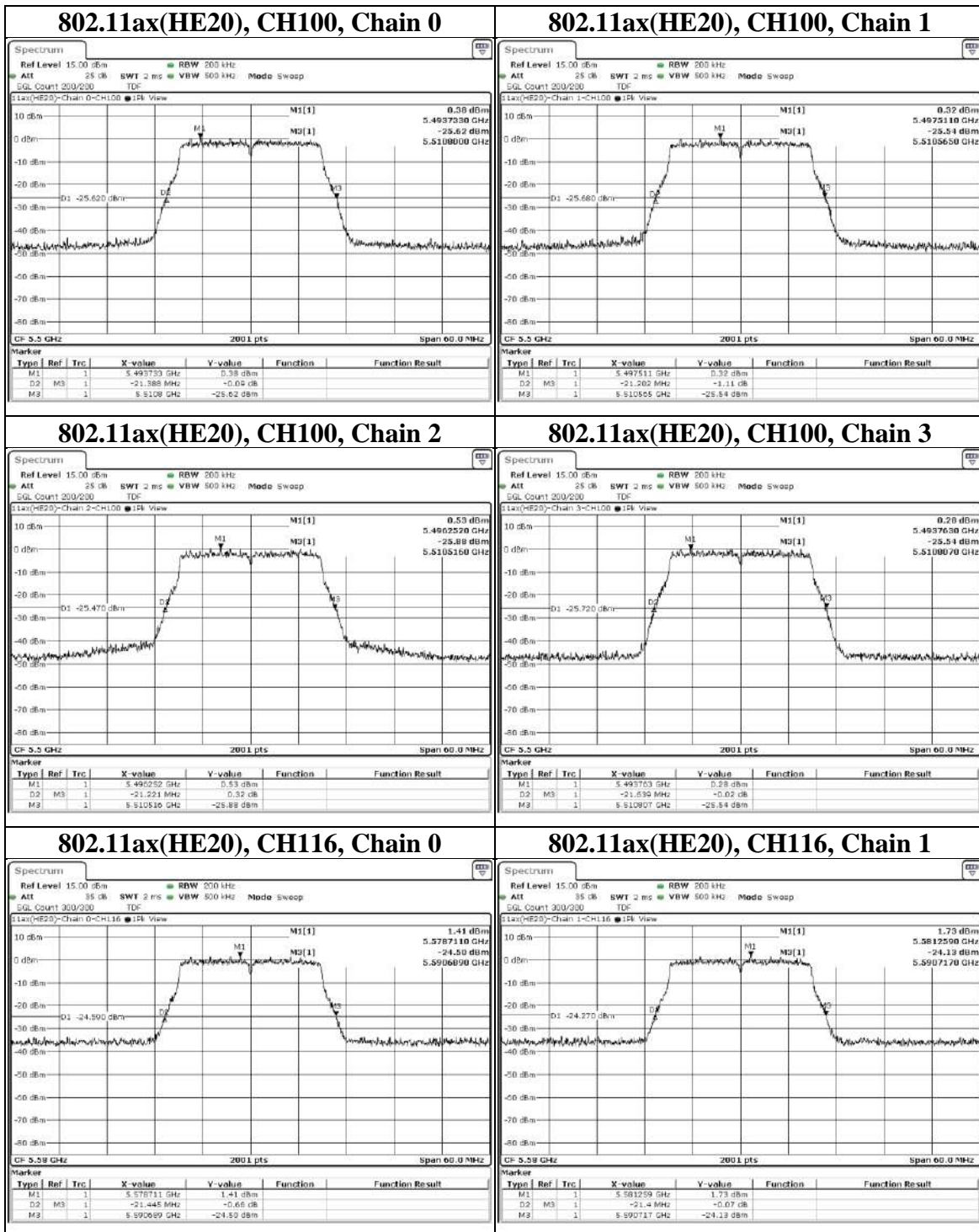
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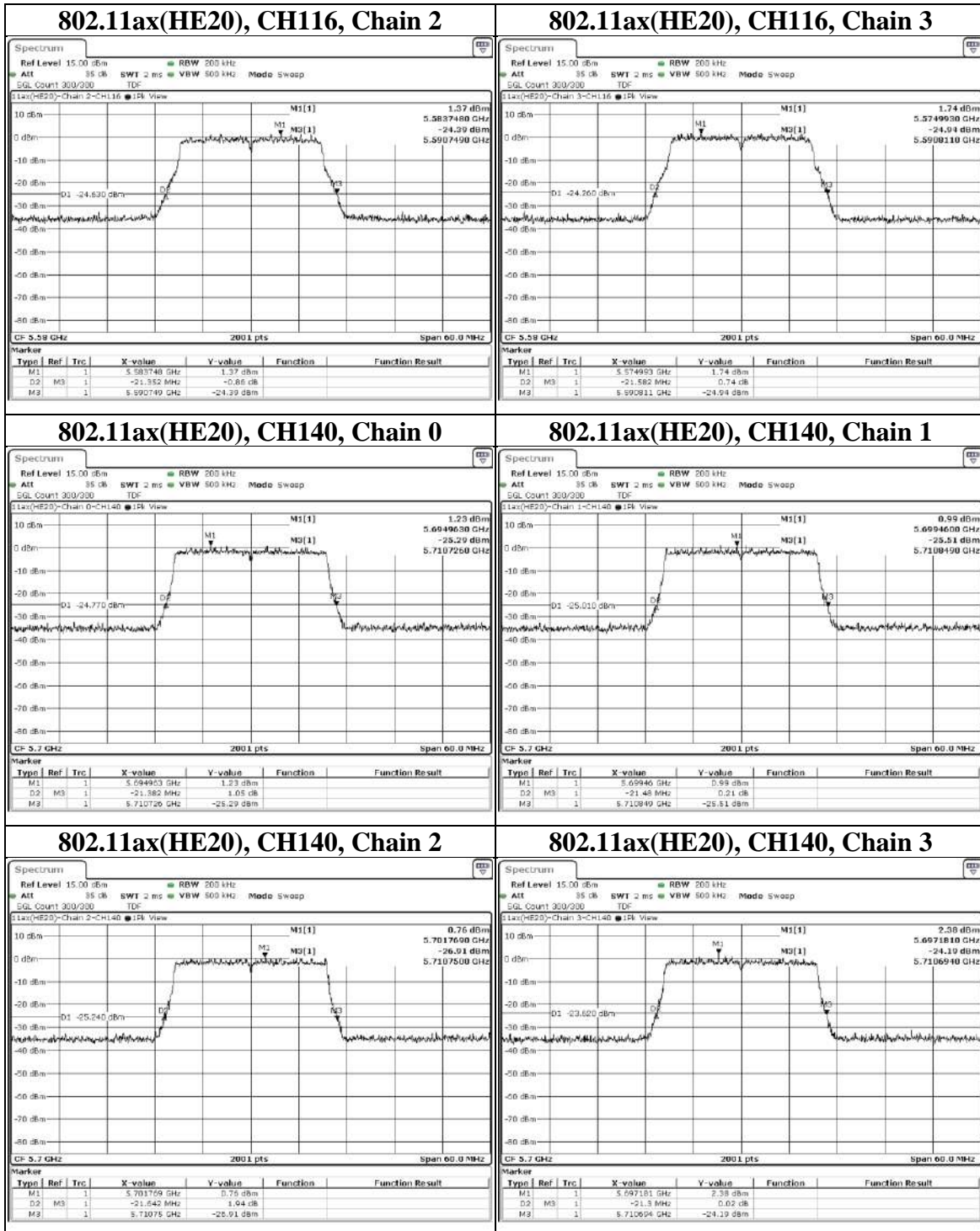


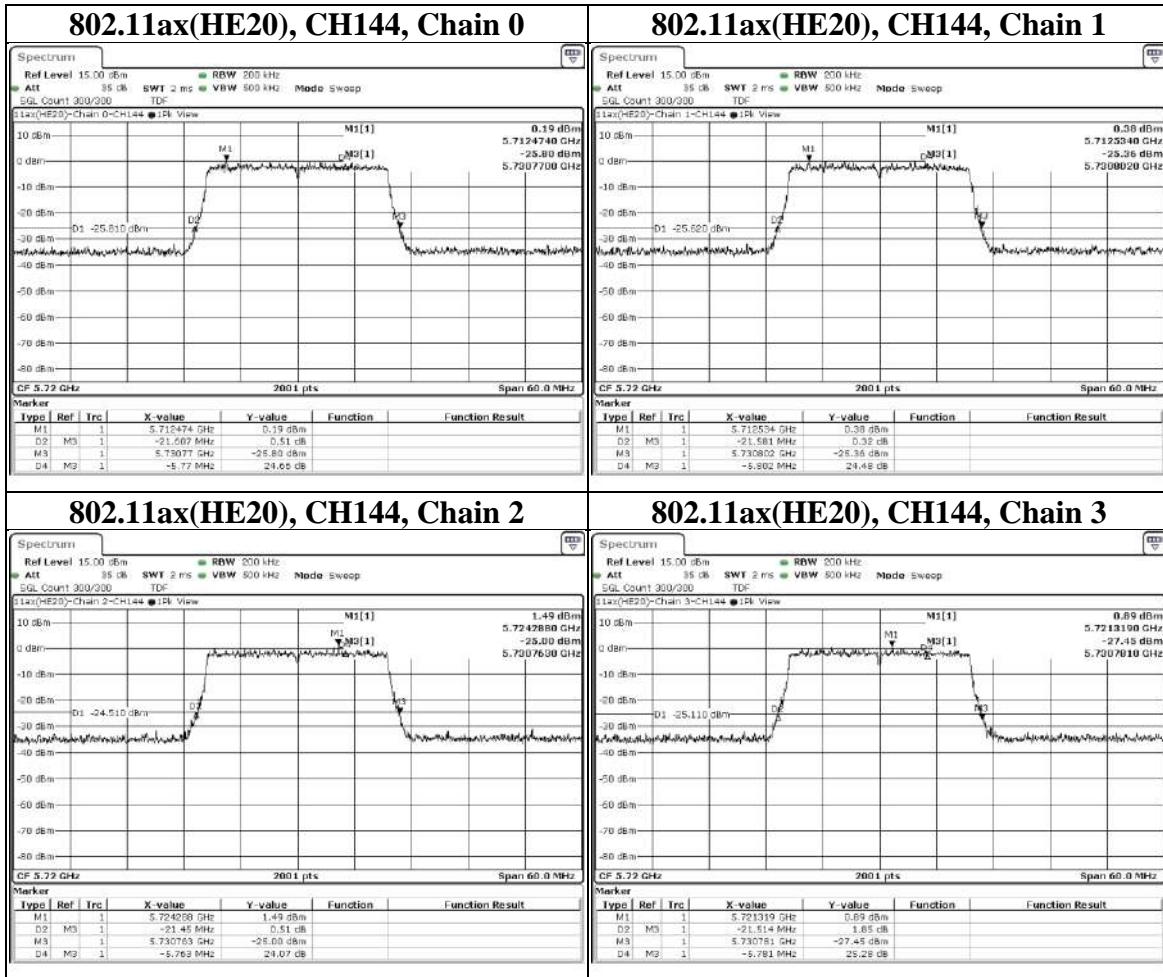












Mode	CH	Freq (MHz)	26dB BW (MHz)				Limit (MHz)	Result
			Chain 0	Chain 1	Chain 2	Chain 3		
802.11ax (HE40)	38	5190	39.714	39.868	39.529	40.19	N/A	PASS
	46	5230	40.551	40.31	40.121	40.27	N/A	PASS
	54	5270	40.616	40.379	40.612	40.309	N/A	PASS
	62	5310	40.337	40.339	40.615	40.623	N/A	PASS
	102	5510	39.829	39.827	39.523	40.179	N/A	PASS
	110	5550	40.324	40.29	40.647	40.635	N/A	PASS
	134	5670	40.611	40.548	40.642	40.536	N/A	PASS
	142 (U-NII-2C)	5710	35.282	35.218	35.293	35.337	N/A	PASS
	142 (U-NII-2C+U-NII-3)	5710	40.53	40.542	40.652	40.76	N/A	PASS
	142 (U-NII-3)	5710	5.248	5.324	5.359	5.423	N/A	PASS

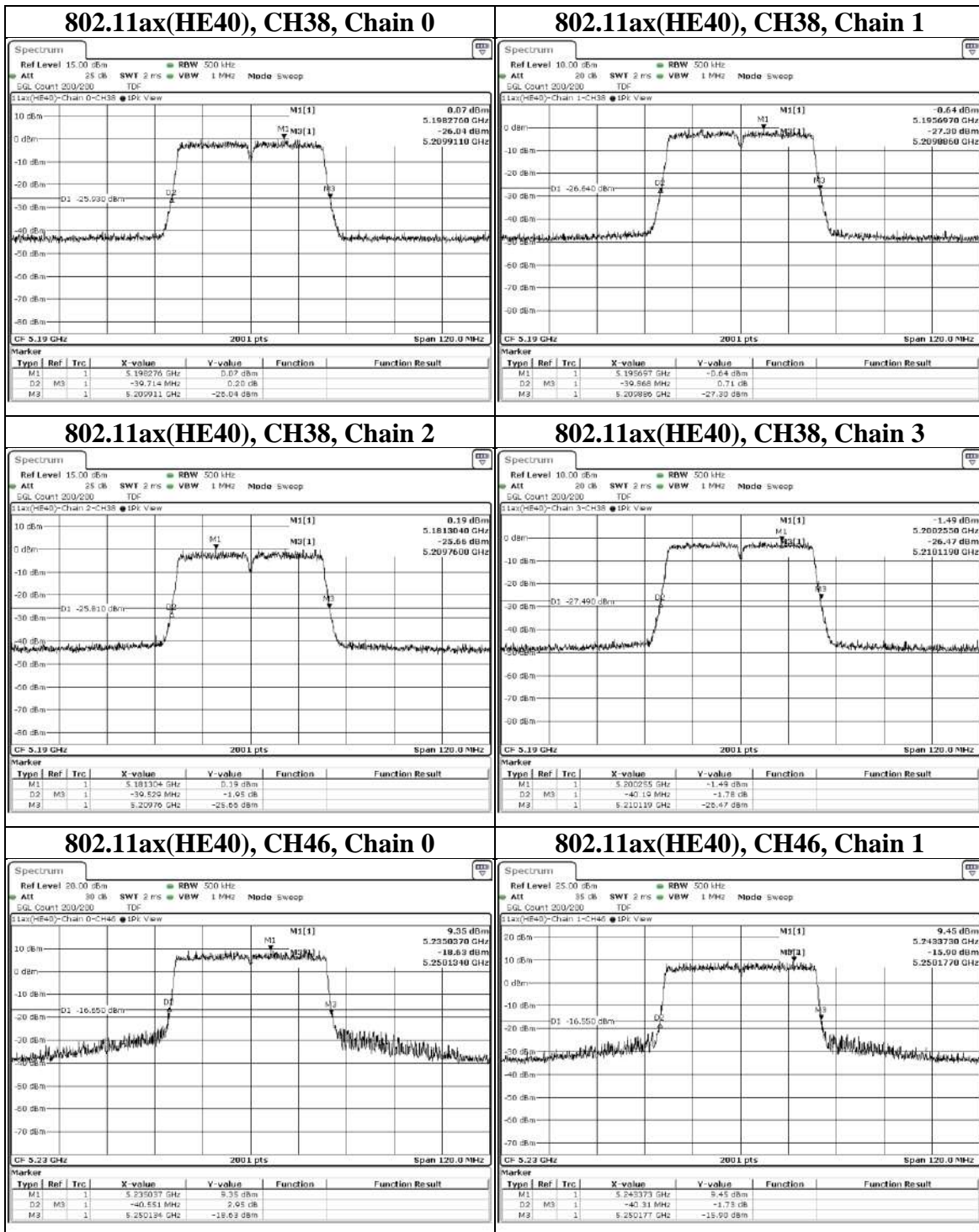
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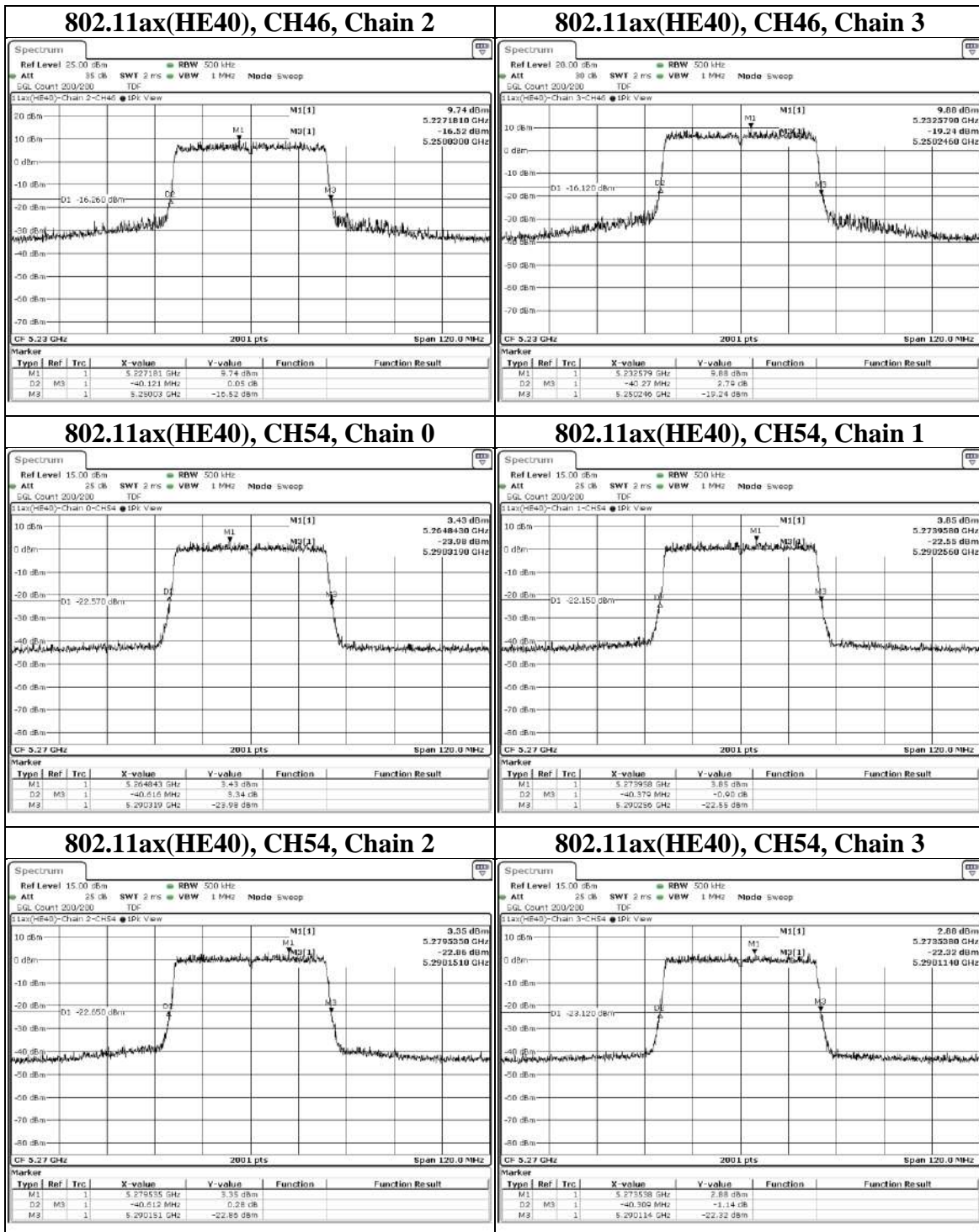
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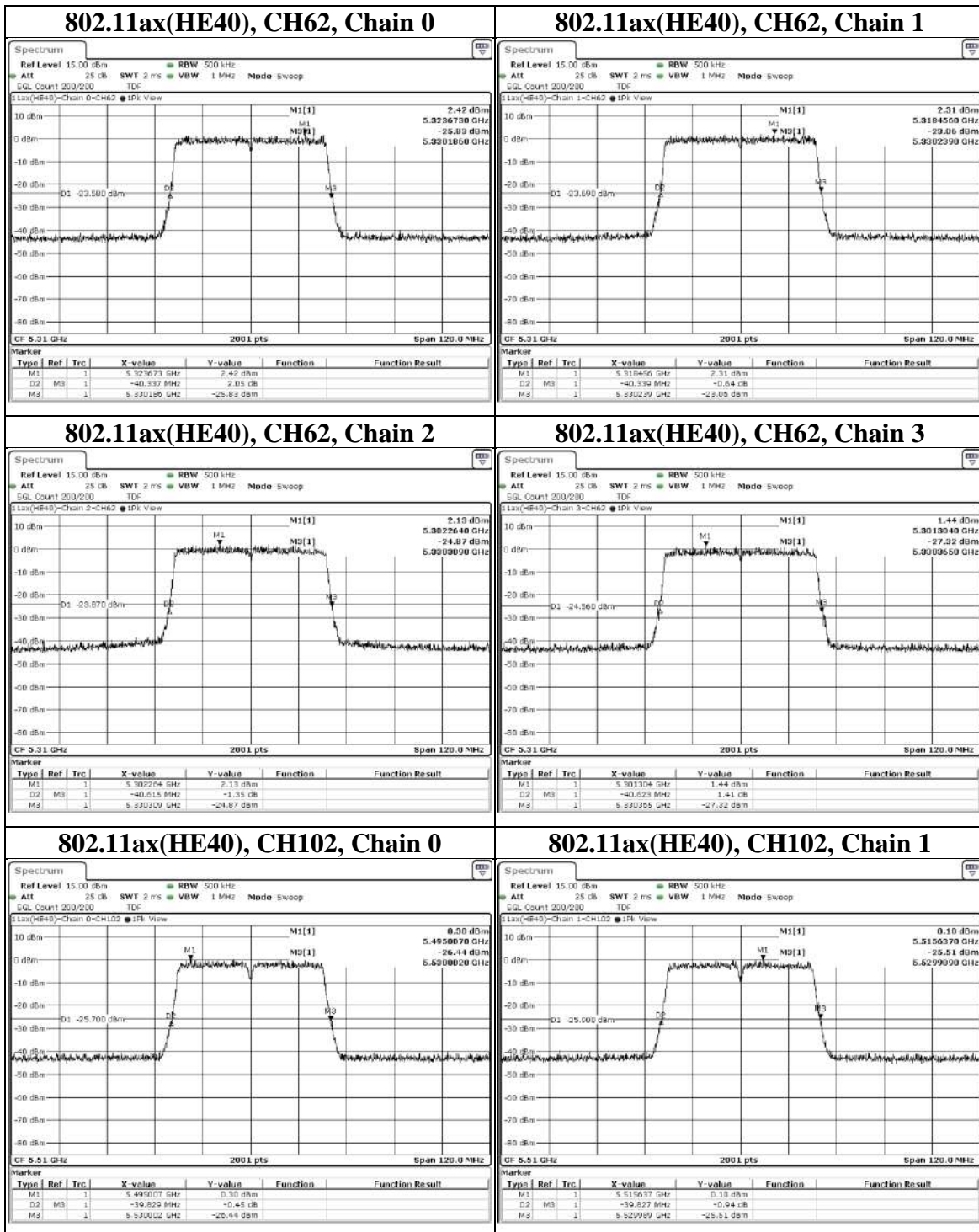
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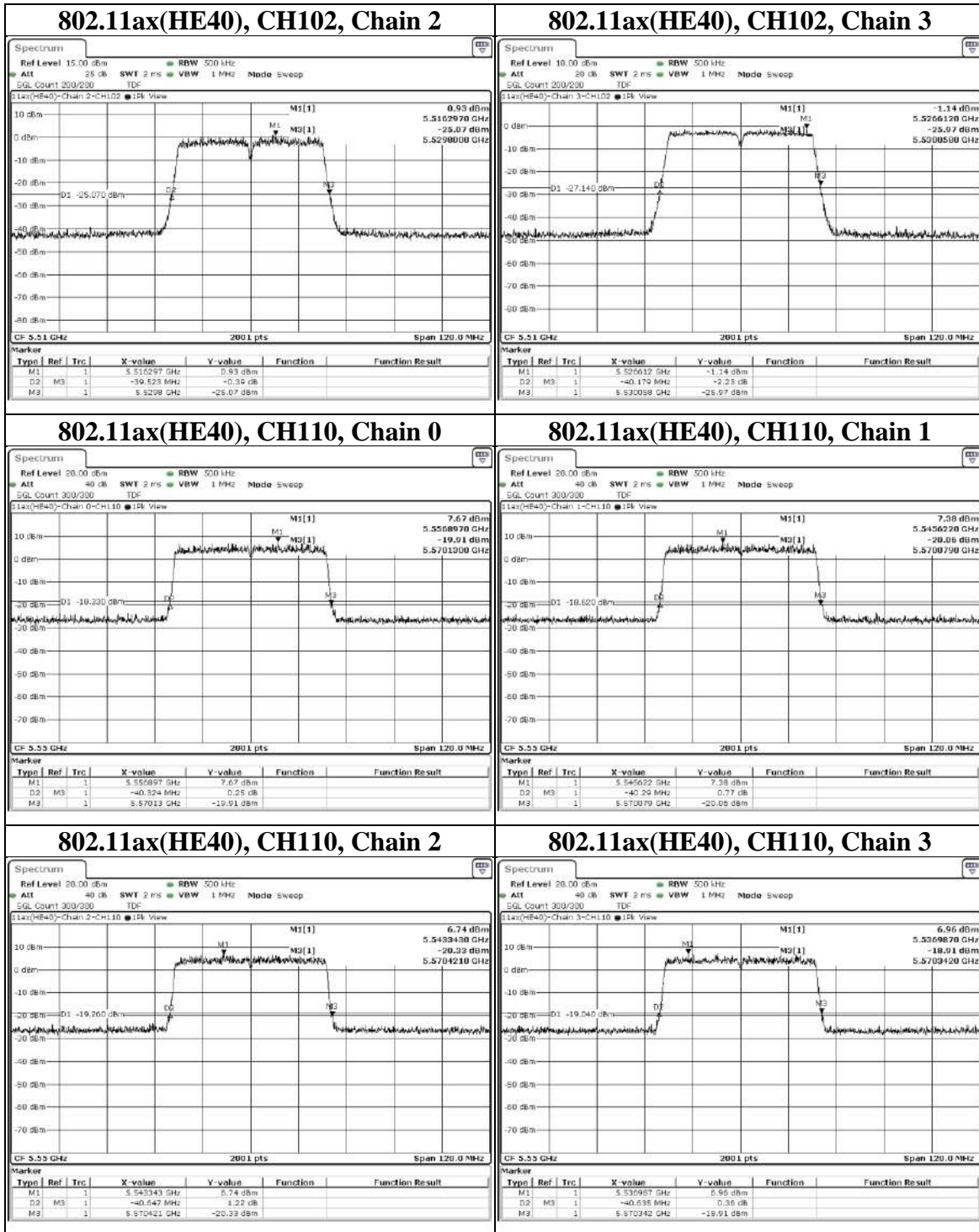
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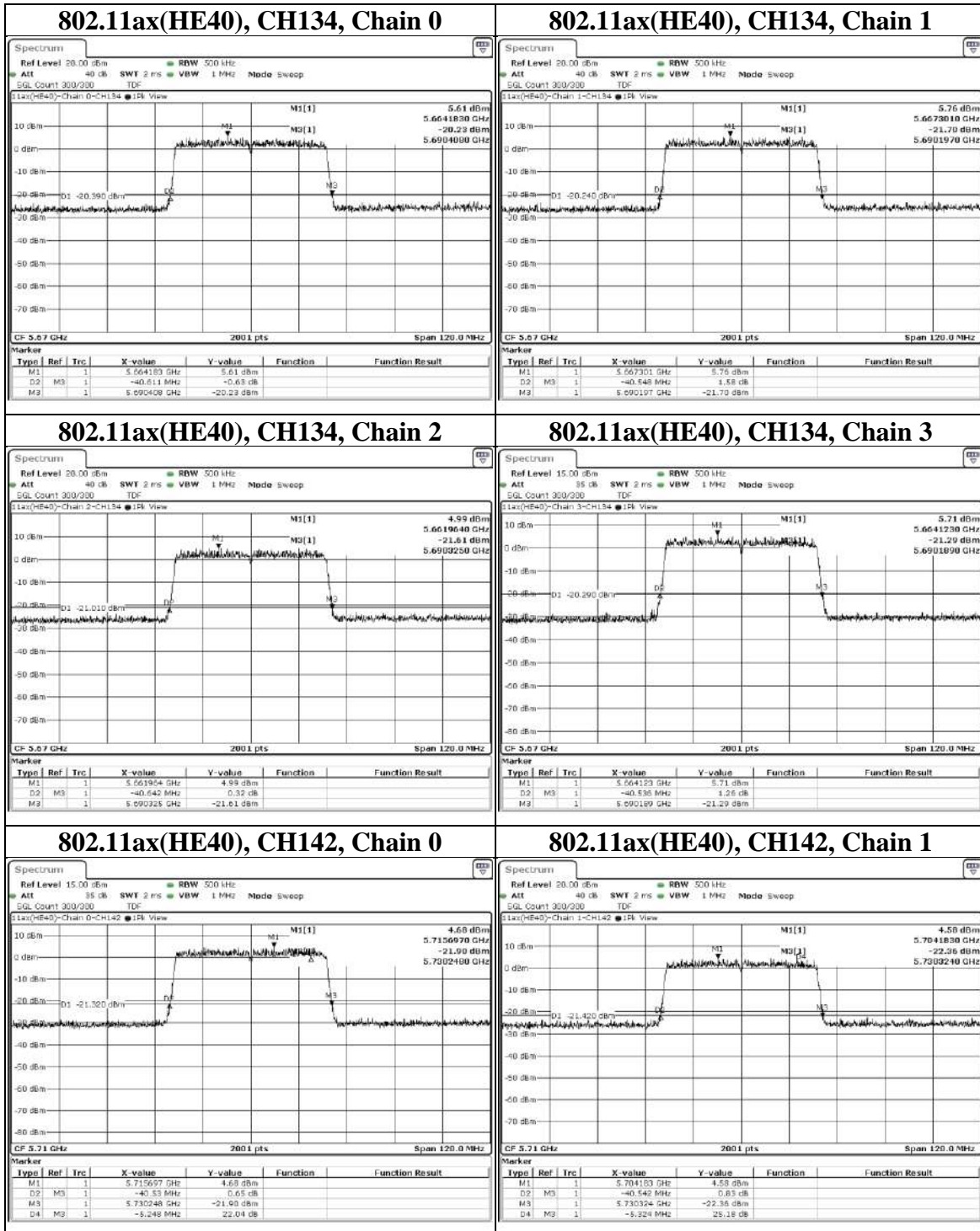
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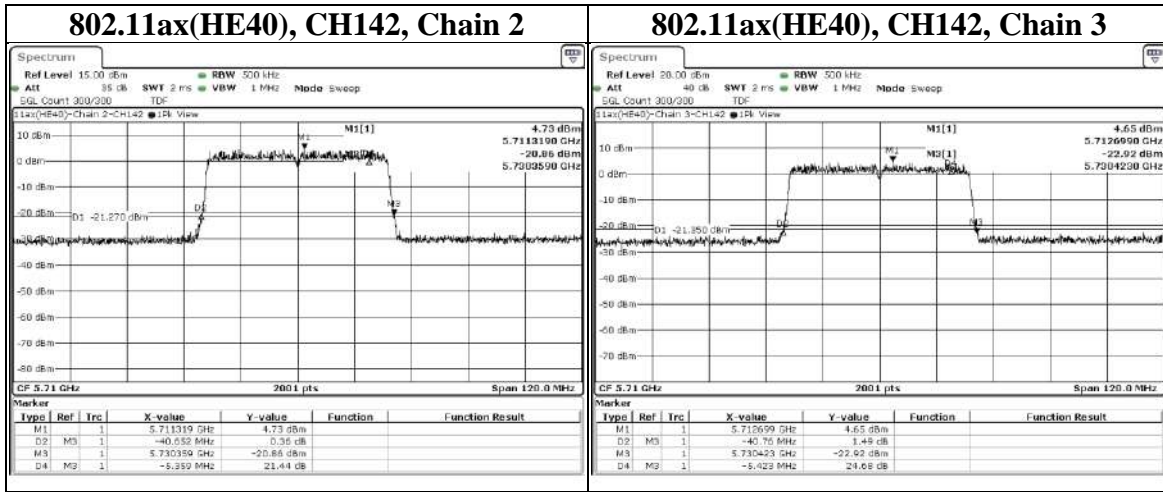












Mode	CH	Freq (MHz)	26dB BW (MHz)				Limit (MHz)	Result
			Chain 0	Chain 1	Chain 2	Chain 3		
802.11ax (HE80)	42	5210	82.049	81.307	82.027	82.139	N/A	PASS
	58	5290	81.596	81.887	82.31	82.034	N/A	PASS
	106	5530	82.031	81.461	82.295	81.858	N/A	PASS
	122	5610	82.476	82.515	82.641	82.619	N/A	PASS
	138 (U-NII-2C)	5690	75.972	75.831	76.181	76.213	N/A	PASS
	138 (U-NII-2C+U-NII-3)	5690	81.873	82.115	82.657	82.664	N/A	PASS
	138 (U-NII-3)	5690	5.901	6.284	6.476	6.451	N/A	PASS

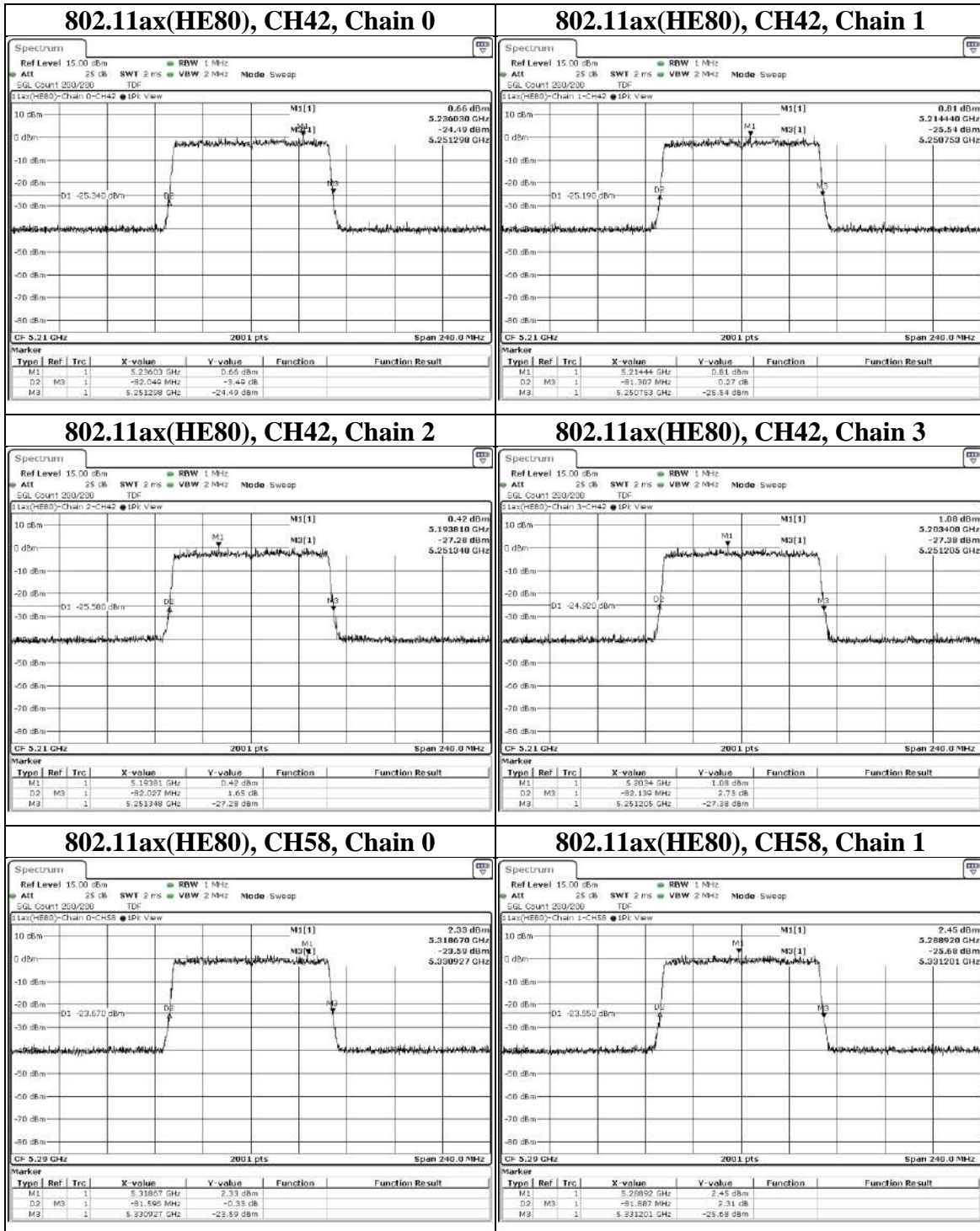
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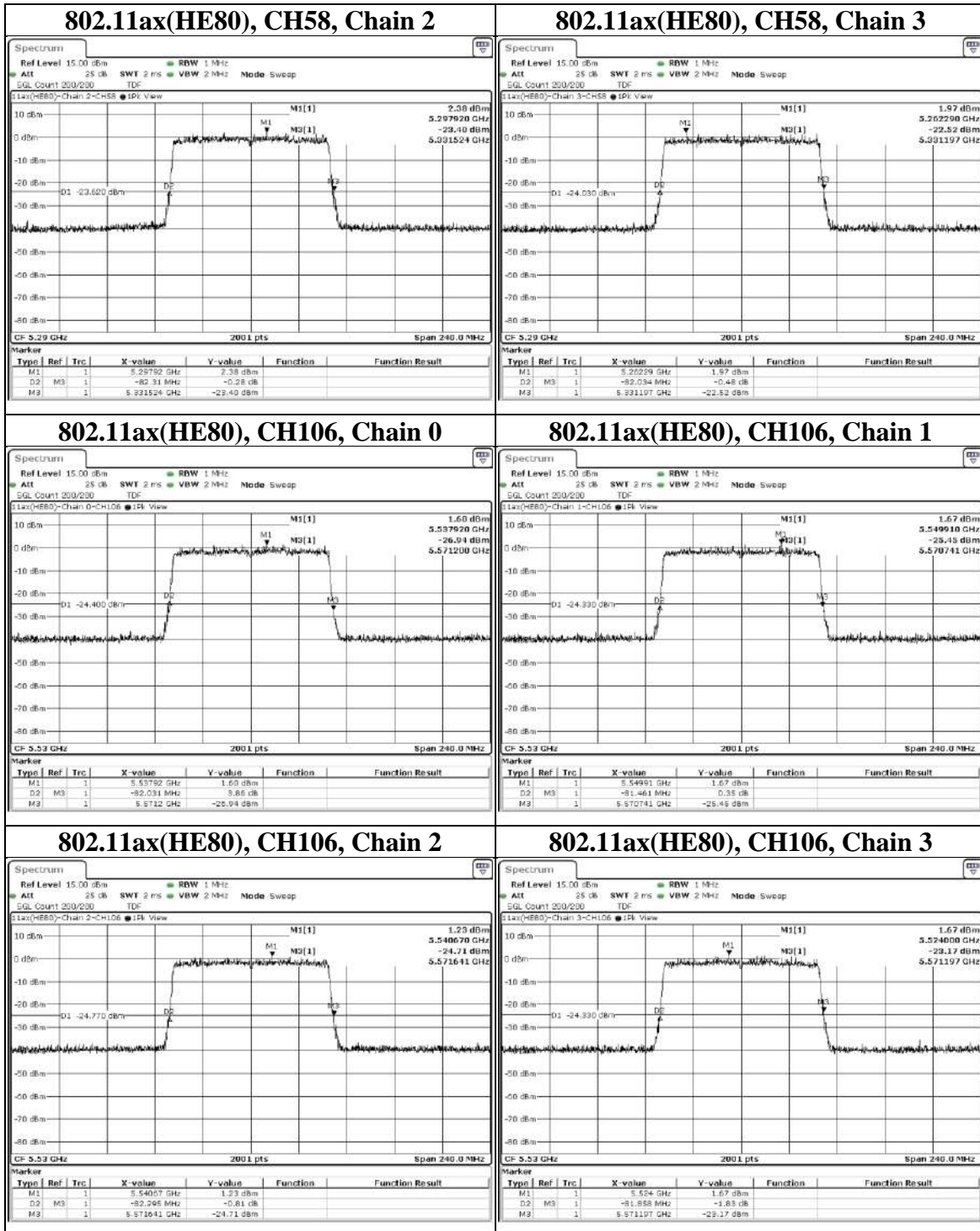
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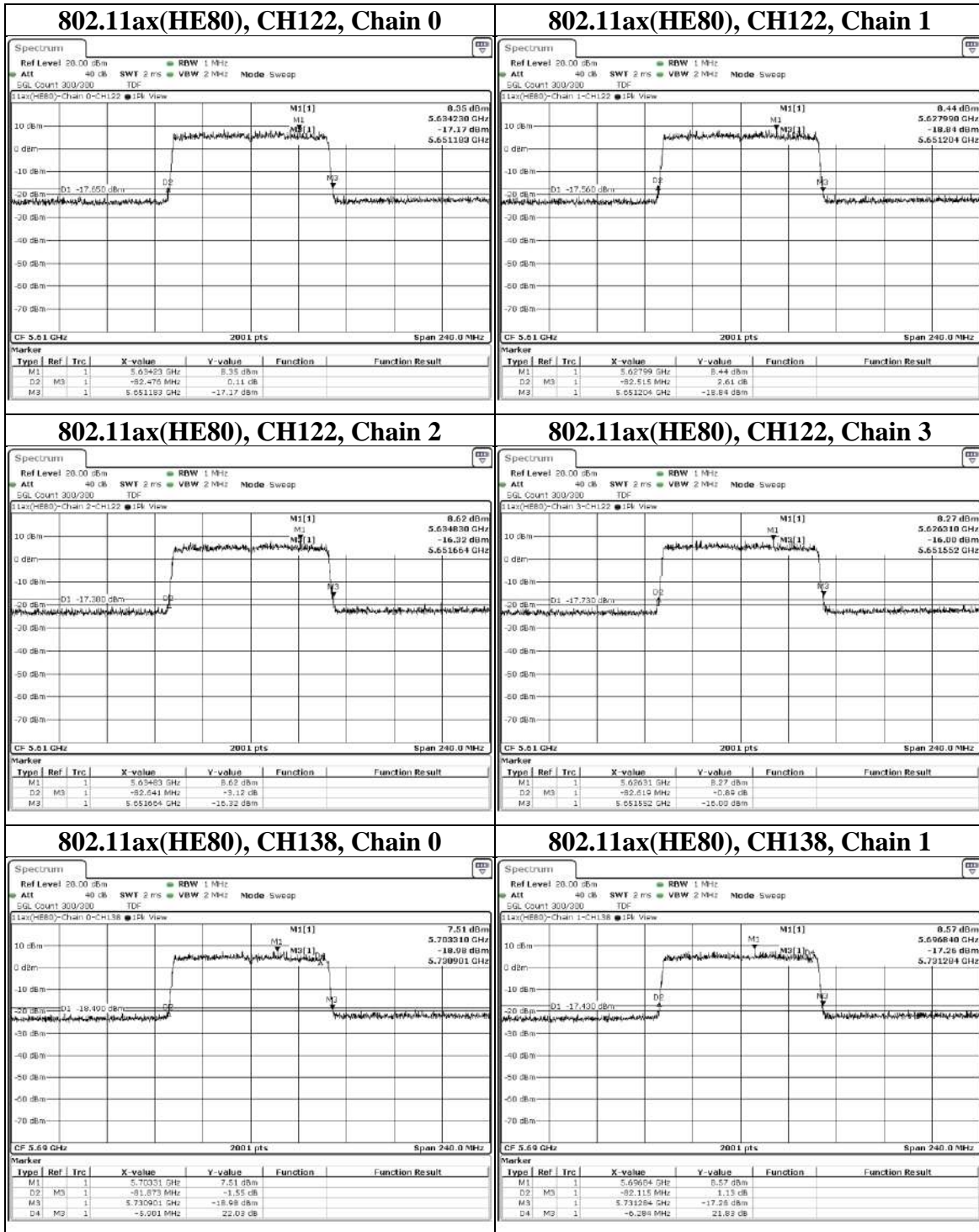
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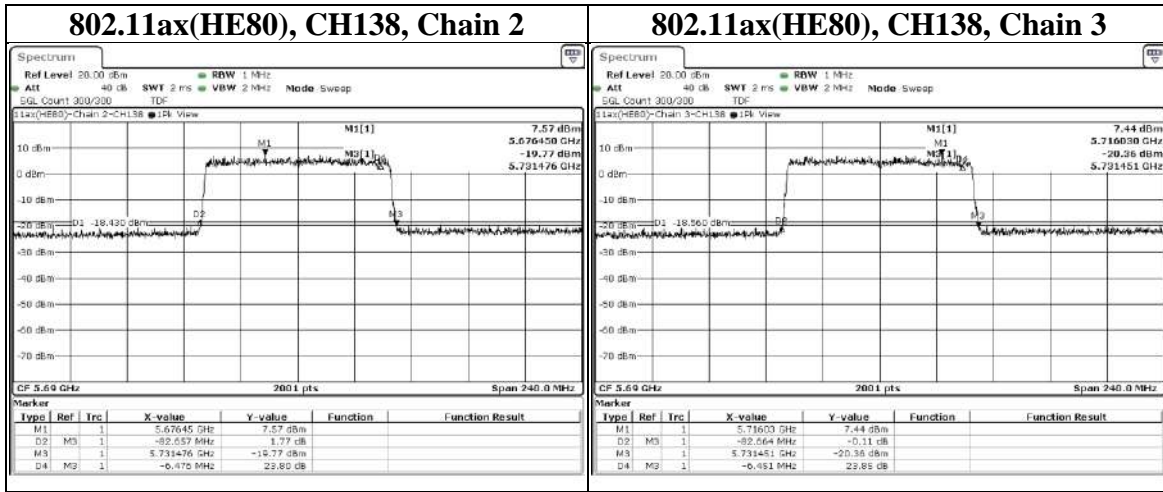
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Mode	CH	Freq (MHz)	26dB BW (MHz)				Limit (MHz)	Result
			Chain 0	Chain 1	Chain 2	Chain 3		
802.11ax (HE160)	50 (U-NII-1)	5250	81.802	82.437	81.998	82.847	N/A	PASS
	50 (U-NII-1+U-NII-2A)	5250	164.433	165.057	164.818	165.121	N/A	PASS
	50 (U-NII-2A)	5250	82.631	82.62	82.82	82.274	N/A	PASS
	114	5570	165.492	164.786	165.436	164.728	N/A	PASS

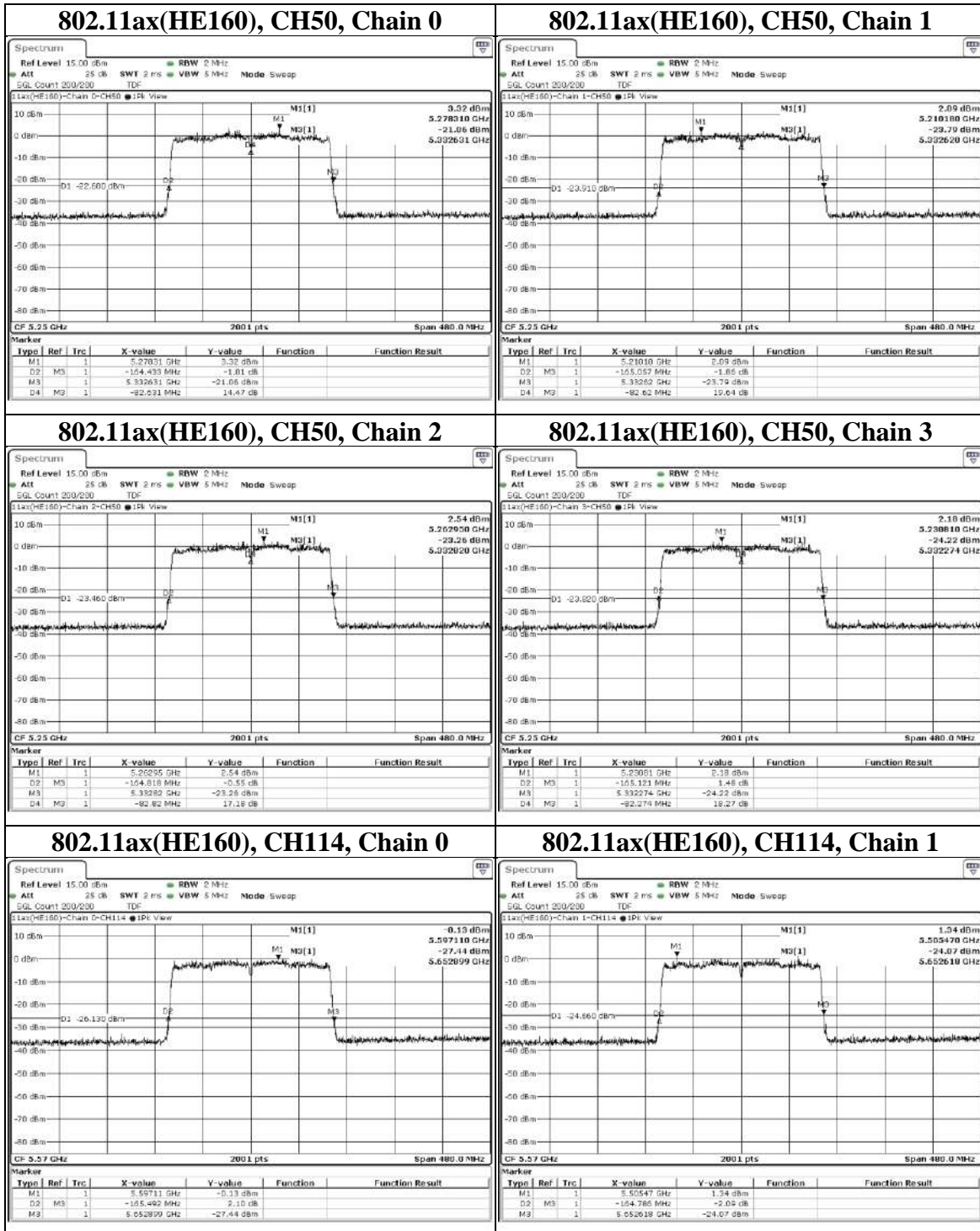
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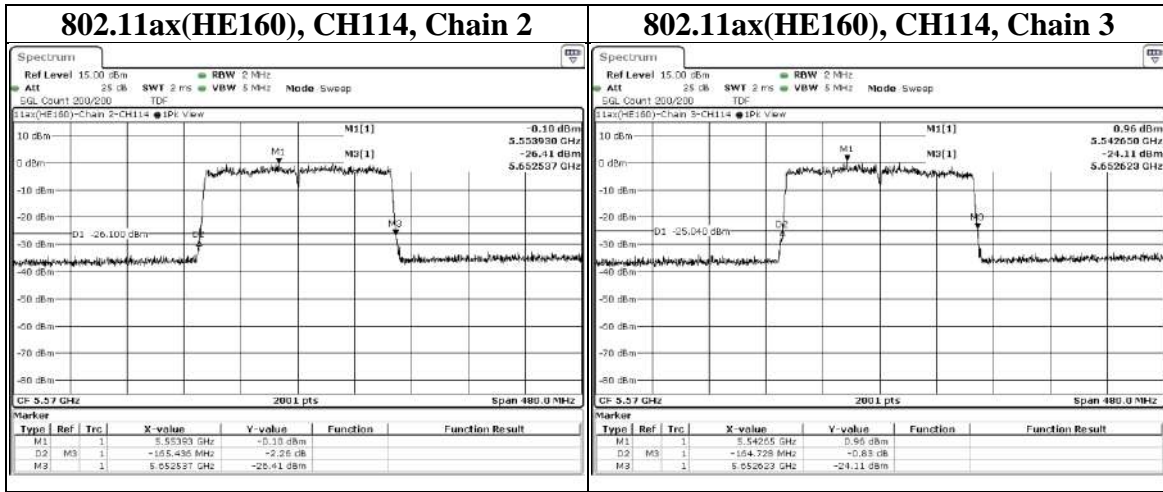
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9.3. Occupied Bandwidth

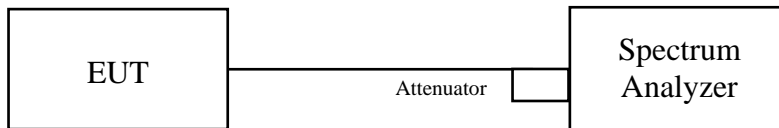
Test procedure

- a. Set center frequency to the nominal EUT channel center frequency.
- b. Set span = 1.5 times to 5.0 times the OBW.
- c. Set RBW = 1% to 5% of the OBW
- d. Set VBW $\geq 3 \times$ RBW
- e. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
- f. Use the 99% power bandwidth function of the instrument (if available).
- g. If the instrument does not have a 99% power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

Note:

1. Straddle Channel Bandwidth below 5725MHz = Delta 2 – Delta 4.
2. Straddle Channel Bandwidth above 5725MHz = Delta 4 (marked on the 5745MHz).

Test Setup



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

Test Data

Mode	CH	Freq (MHz)	OBW (MHz)	Limit (MHz)	Result
			Chain 0		
802.11a	36	5180	17.808	N/A	PASS
	44	5220	23.77	N/A	PASS
	48	5240	18.338	N/A	PASS
	52	5260	18.278	N/A	PASS
	60	5300	18.317	N/A	PASS
	64	5320	18.086	N/A	PASS
	100	5500	17.759	N/A	PASS
	116	5580	17.742	N/A	PASS
	140	5700	17.684	N/A	PASS
	144 (U-NII-2C)	5720	13.88	N/A	PASS
	144 (U-NII-2C+U-NII-3)	5720	17.698	N/A	PASS
	144 (U-NII-3)	5720	3.819	N/A	PASS
	149	5745	17.73	N/A	PASS
	157	5785	17.713	N/A	PASS
165	5825	17.724	N/A	PASS	

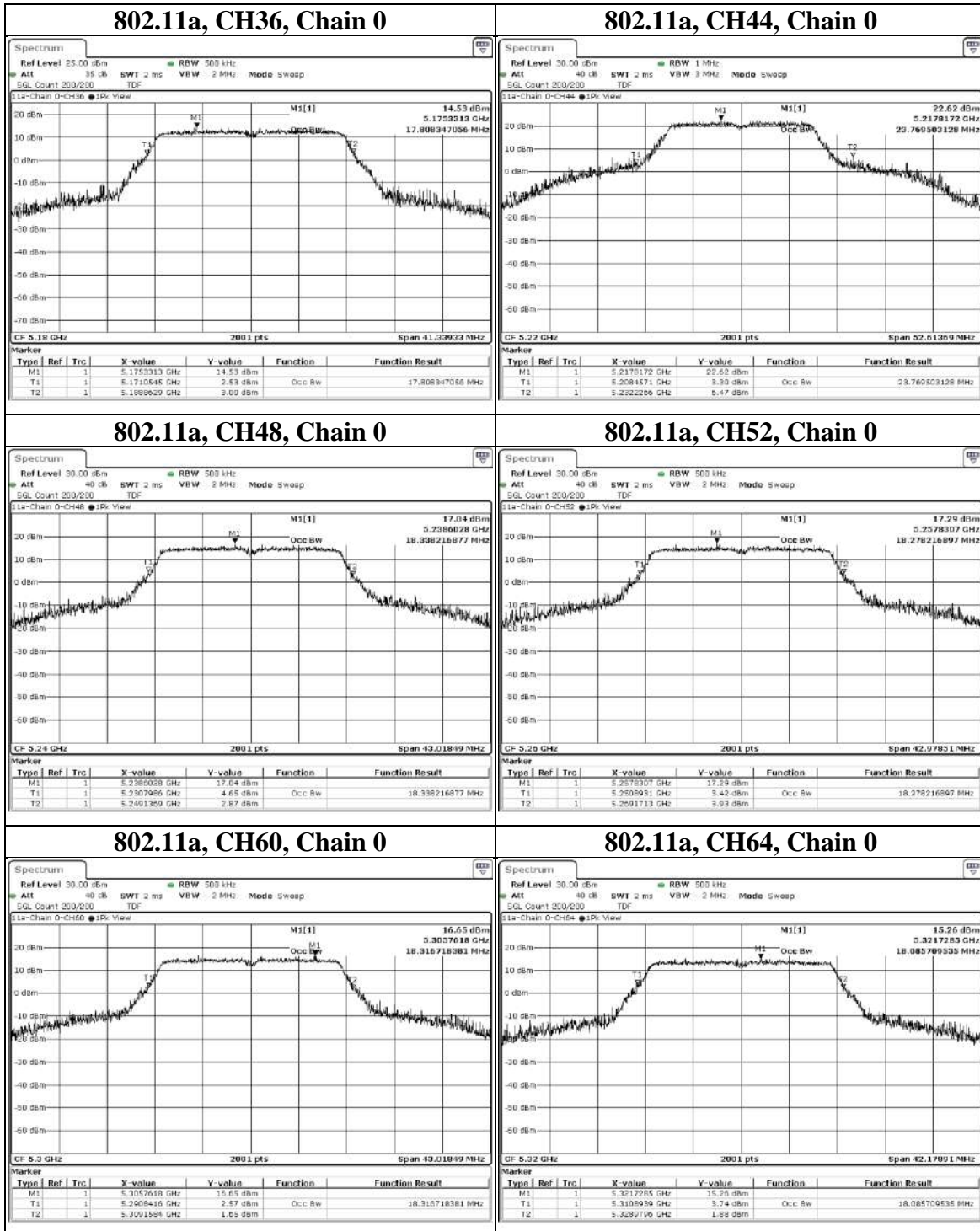
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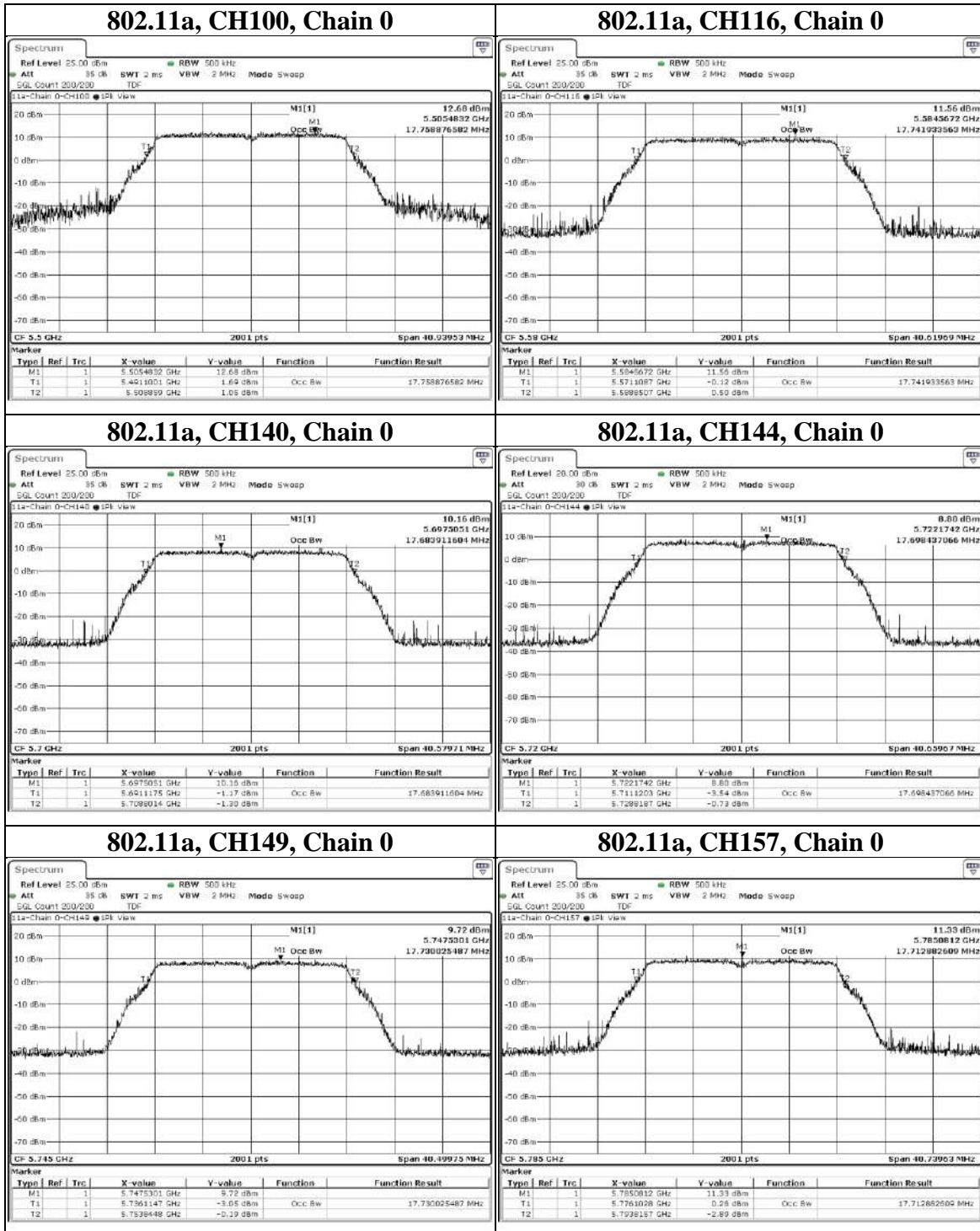
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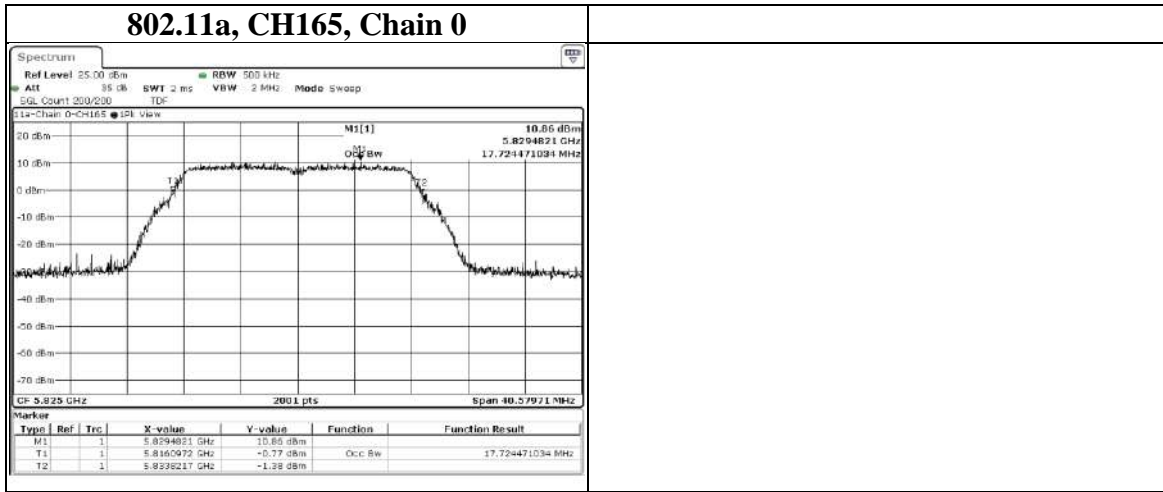
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Mode	CH	Freq (MHz)	OBW (MHz)				Limit (MHz)	Result
			Chain 0	Chain 1	Chain 2	Chain 3		
802.11ax (HE20)	36	5180	19.229	19.25	19.25	19.304	N/A	PASS
	44	5220	18.287	18.334	18.262	18.576	N/A	PASS
	48	5240	19.254	19.254	19.315	19.268	N/A	PASS
	52	5260	18.293	18.372	18.215	18.651	N/A	PASS
	60	5300	19.242	19.242	19.301	19.301	N/A	PASS
	64	5320	18.335	18.337	18.247	18.627	N/A	PASS
	100	5500	18.314	18.34	18.277	18.612	N/A	PASS
	116	5580	18.423	18.428	18.276	18.773	N/A	PASS
	140	5700	19.336	19.406	19.323	19.392	N/A	PASS
	144 (U-NII-2C)	5720	14.697	14.674	14.723	14.687	N/A	PASS
	144 (U-NII-2C+U-NII-3)	5720	19.393	19.37	19.402	19.418	N/A	PASS
	144 (U-NII-3)	5720	4.697	4.696	4.679	4.731	N/A	PASS
	149	5745	18.297	18.383	18.254	18.621	N/A	PASS
	157	5785	19.29	19.25	19.26	19.276	N/A	PASS
165	5825	19.26	19.308	19.304	19.295	N/A	PASS	

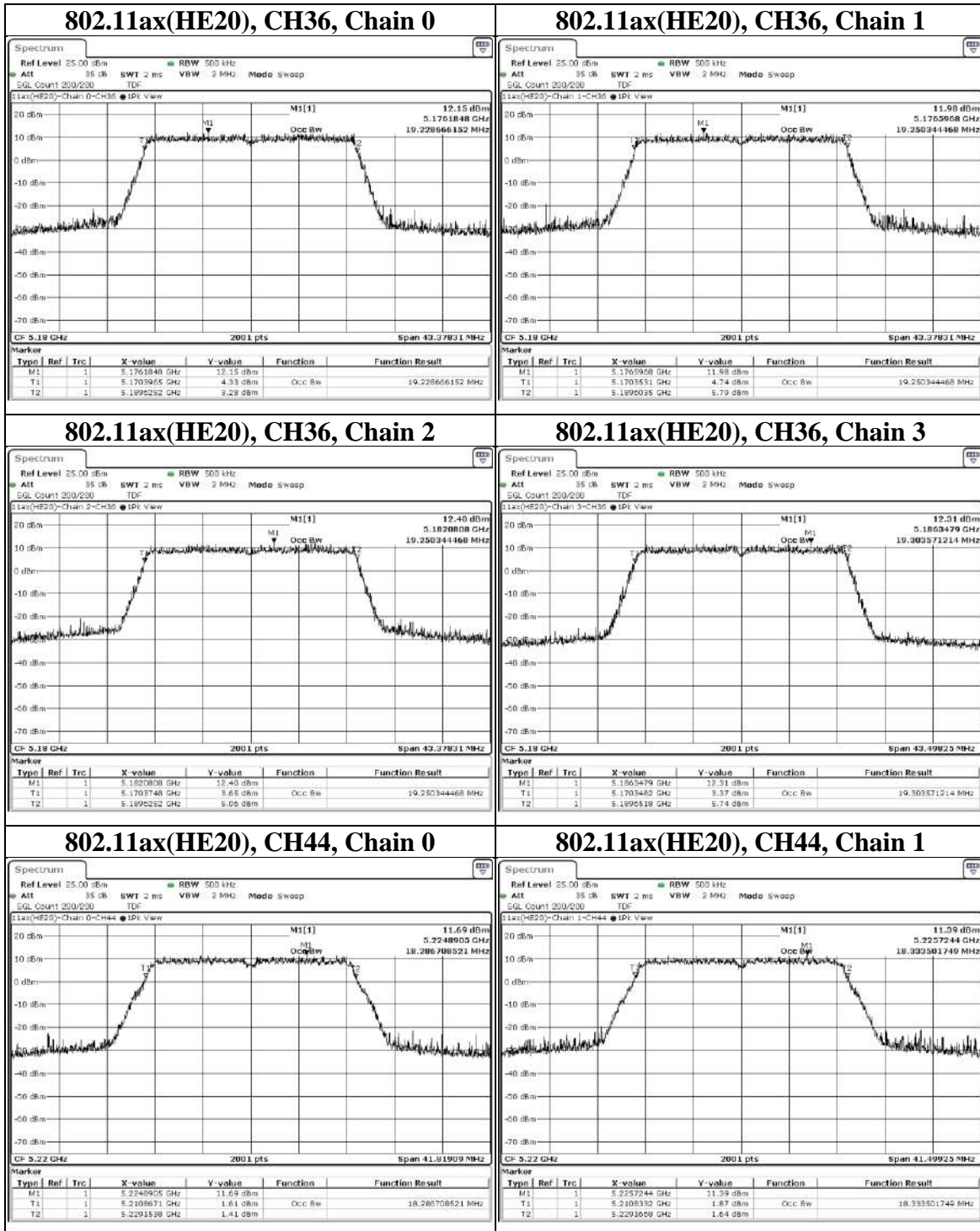
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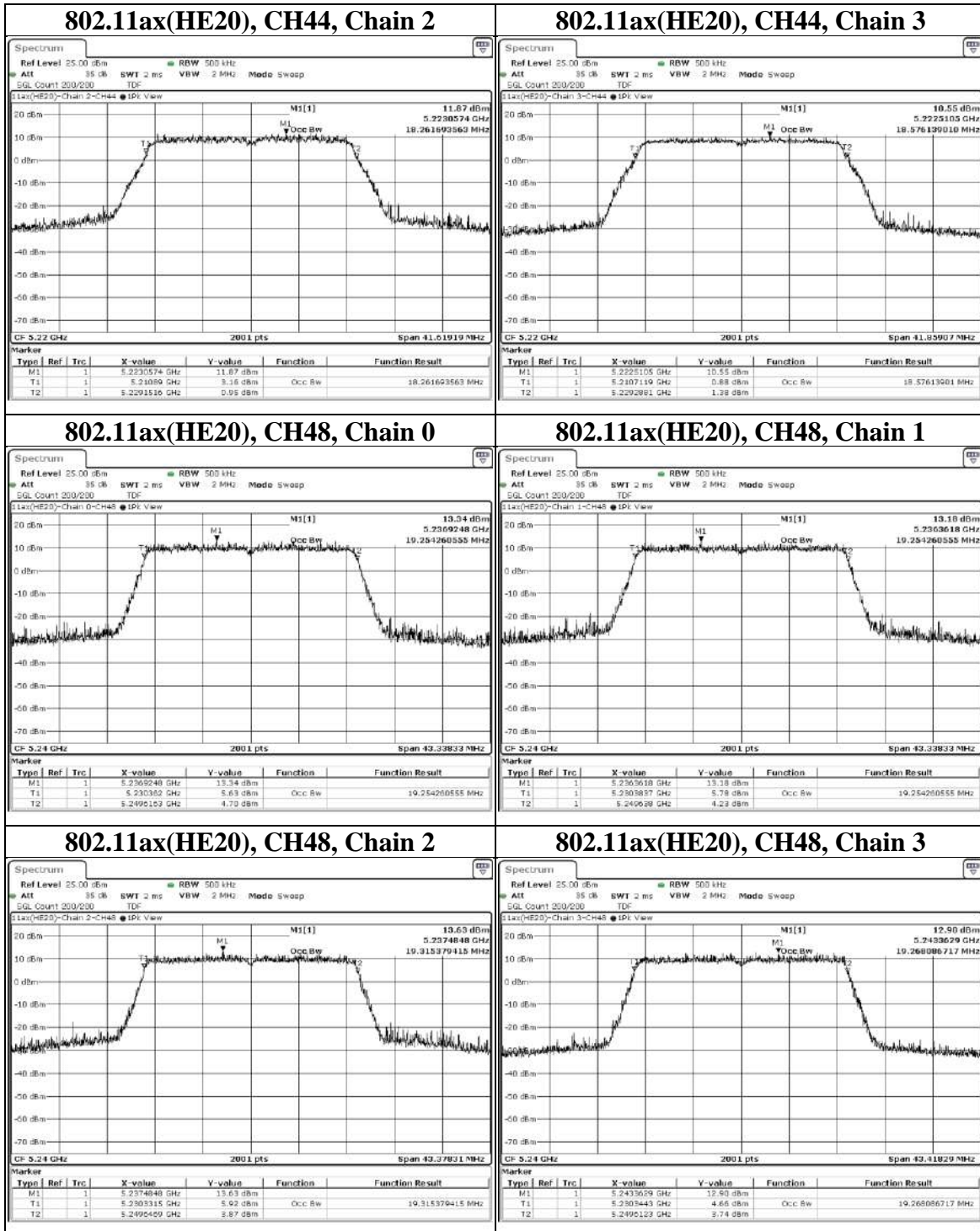
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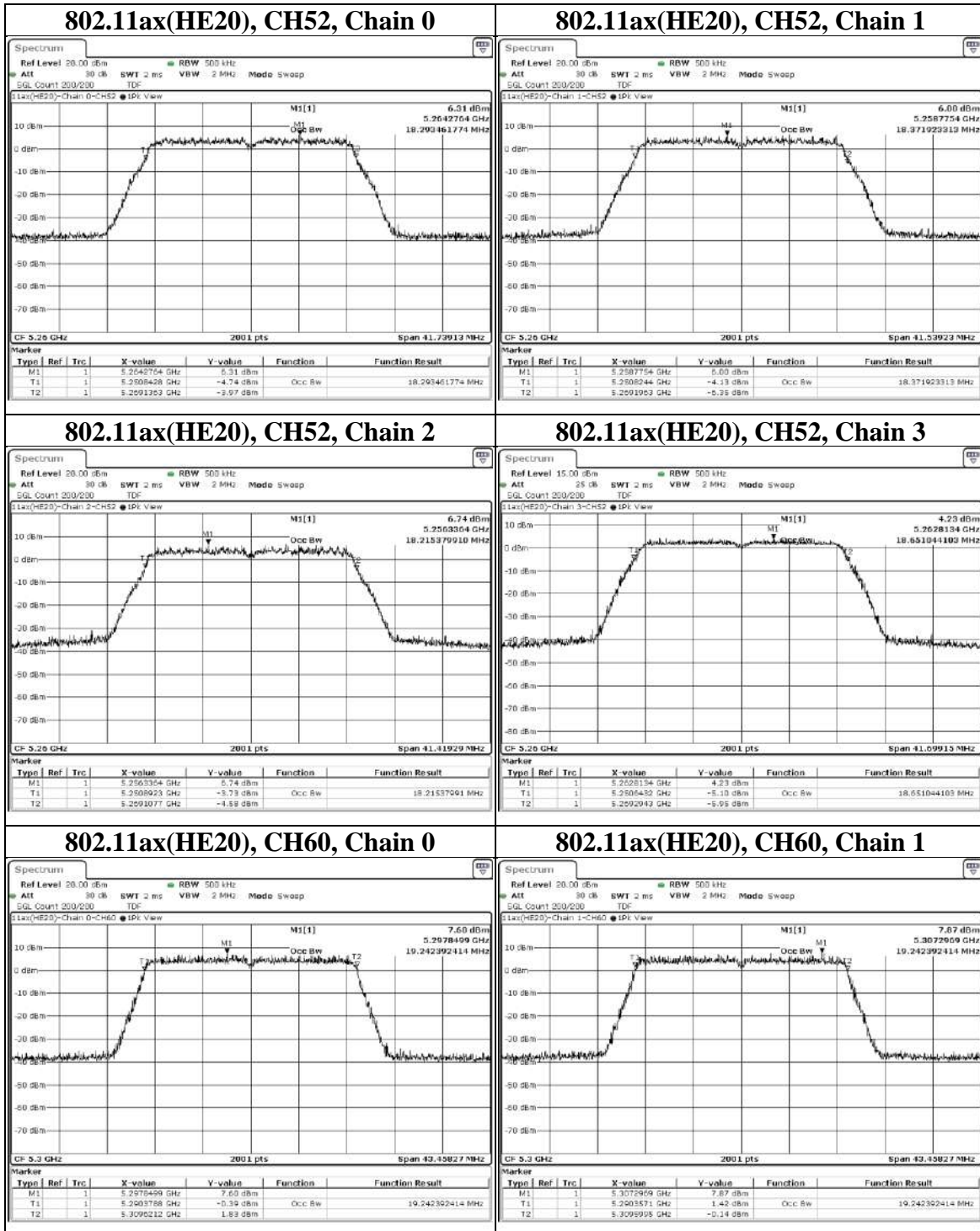
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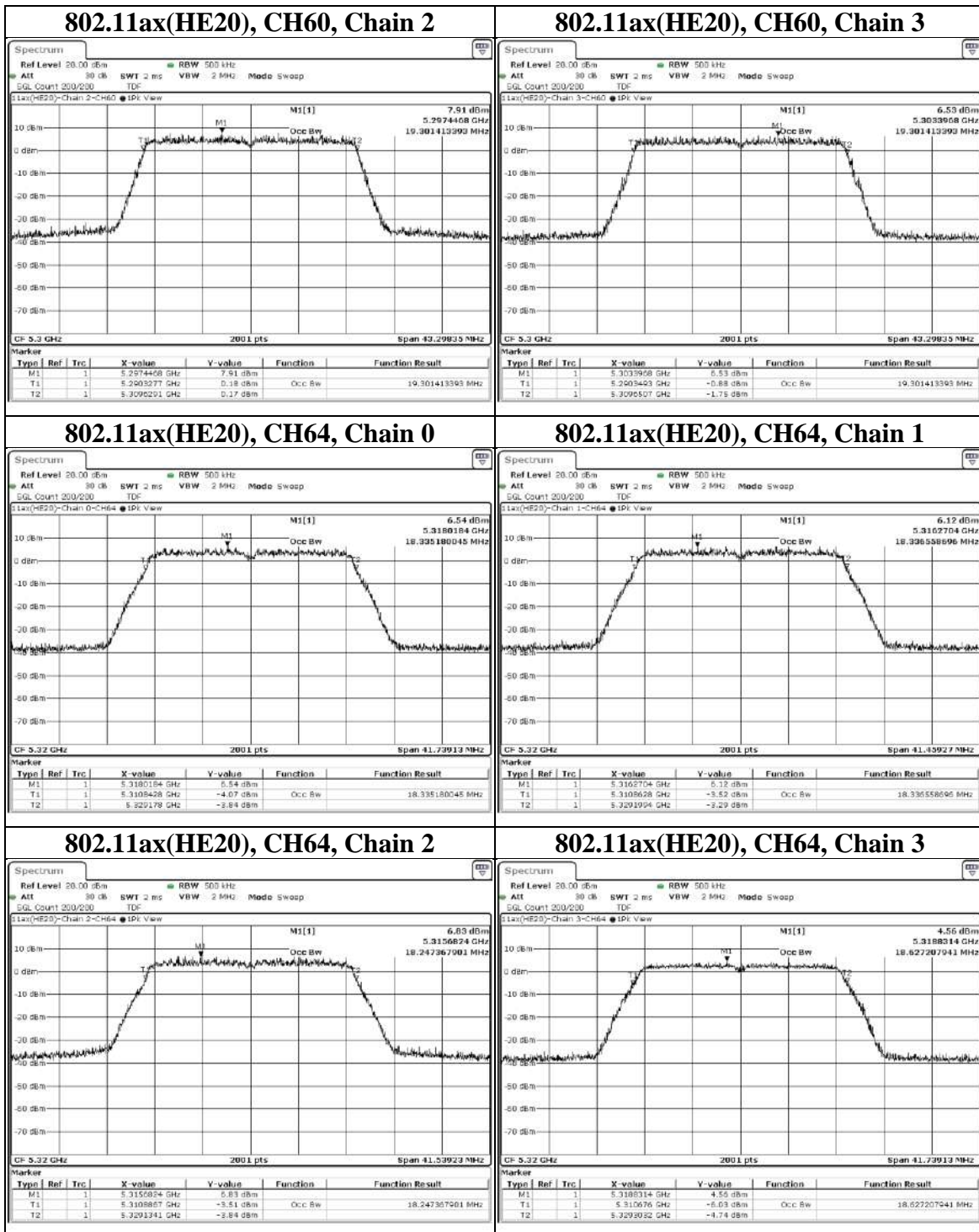
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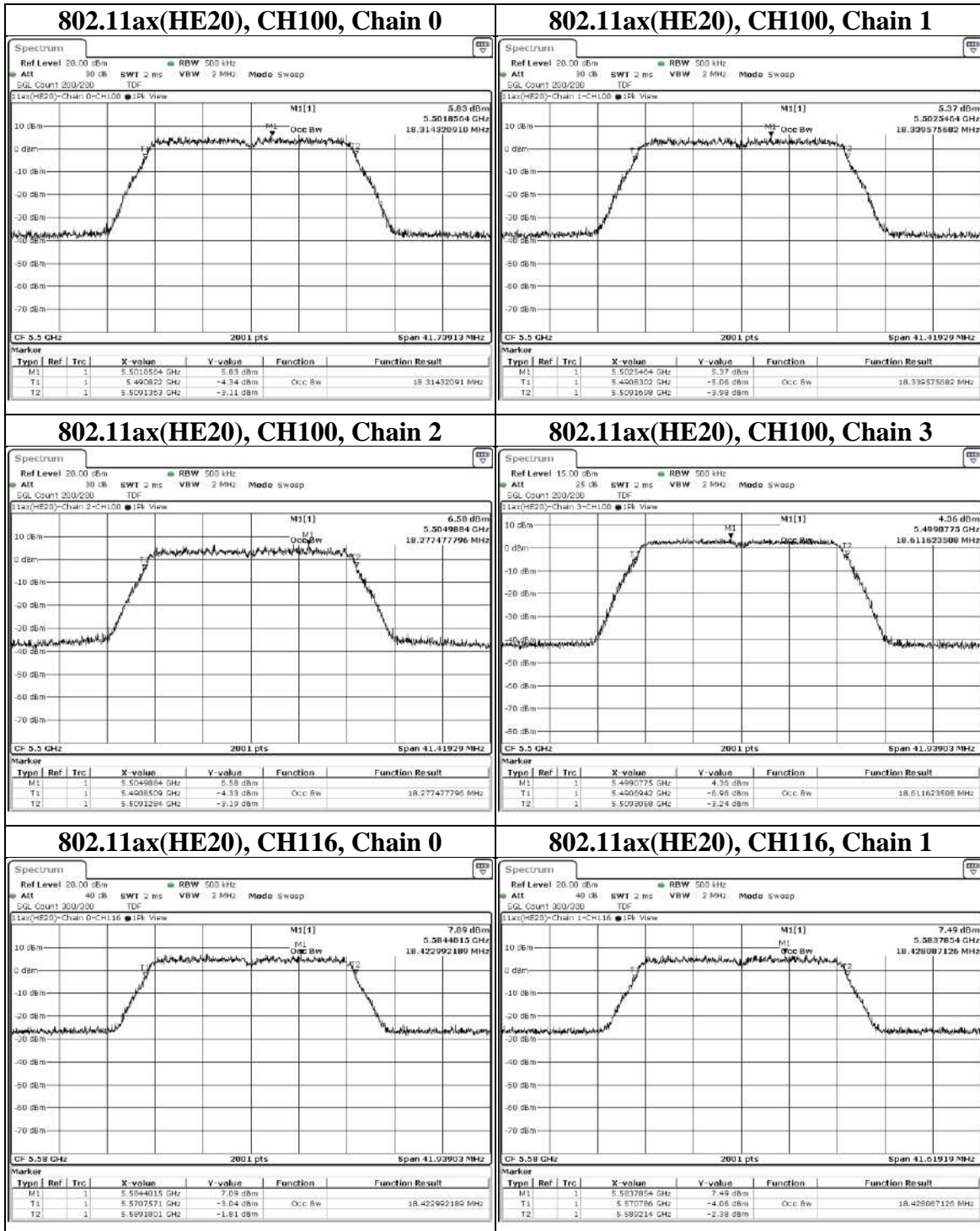
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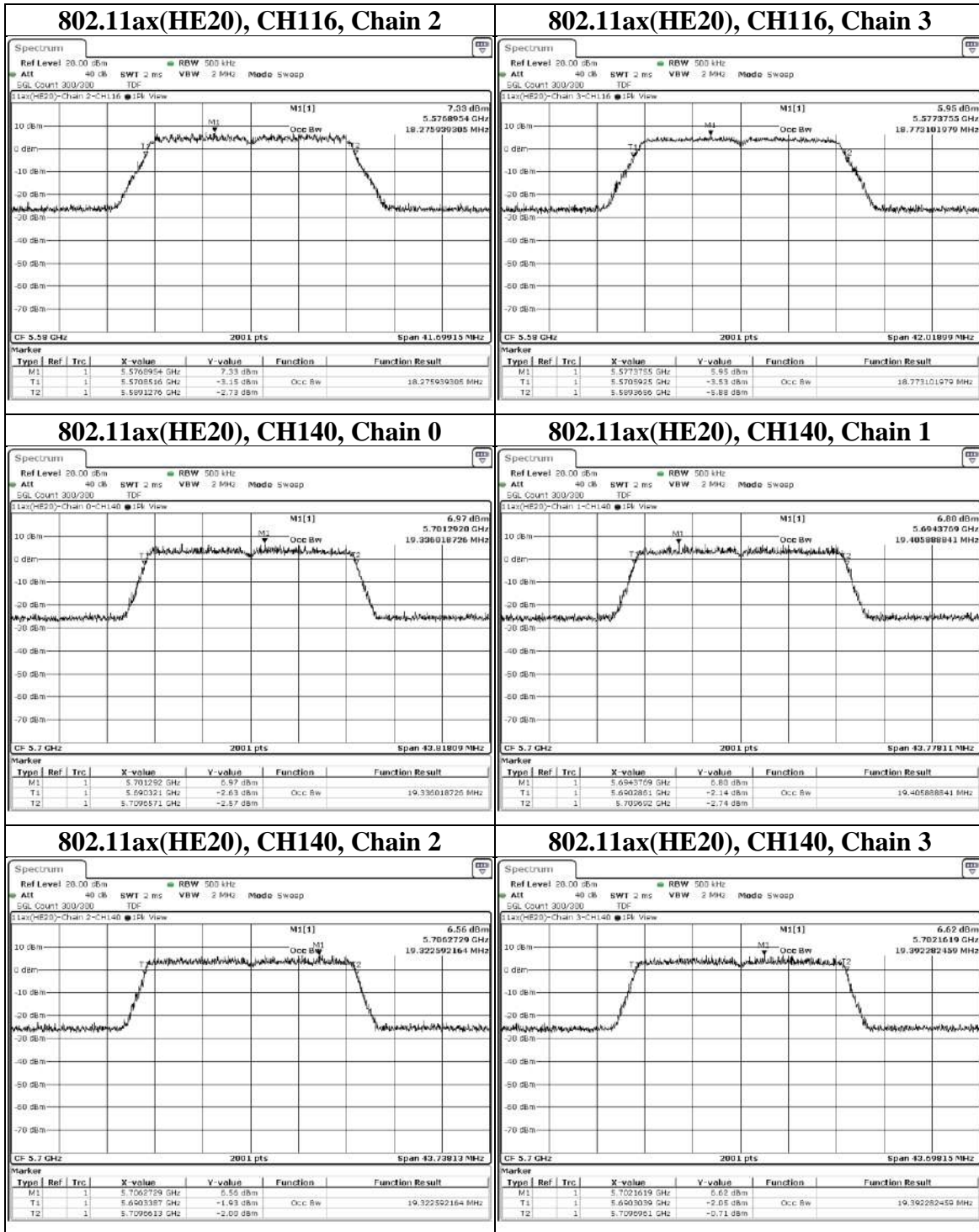


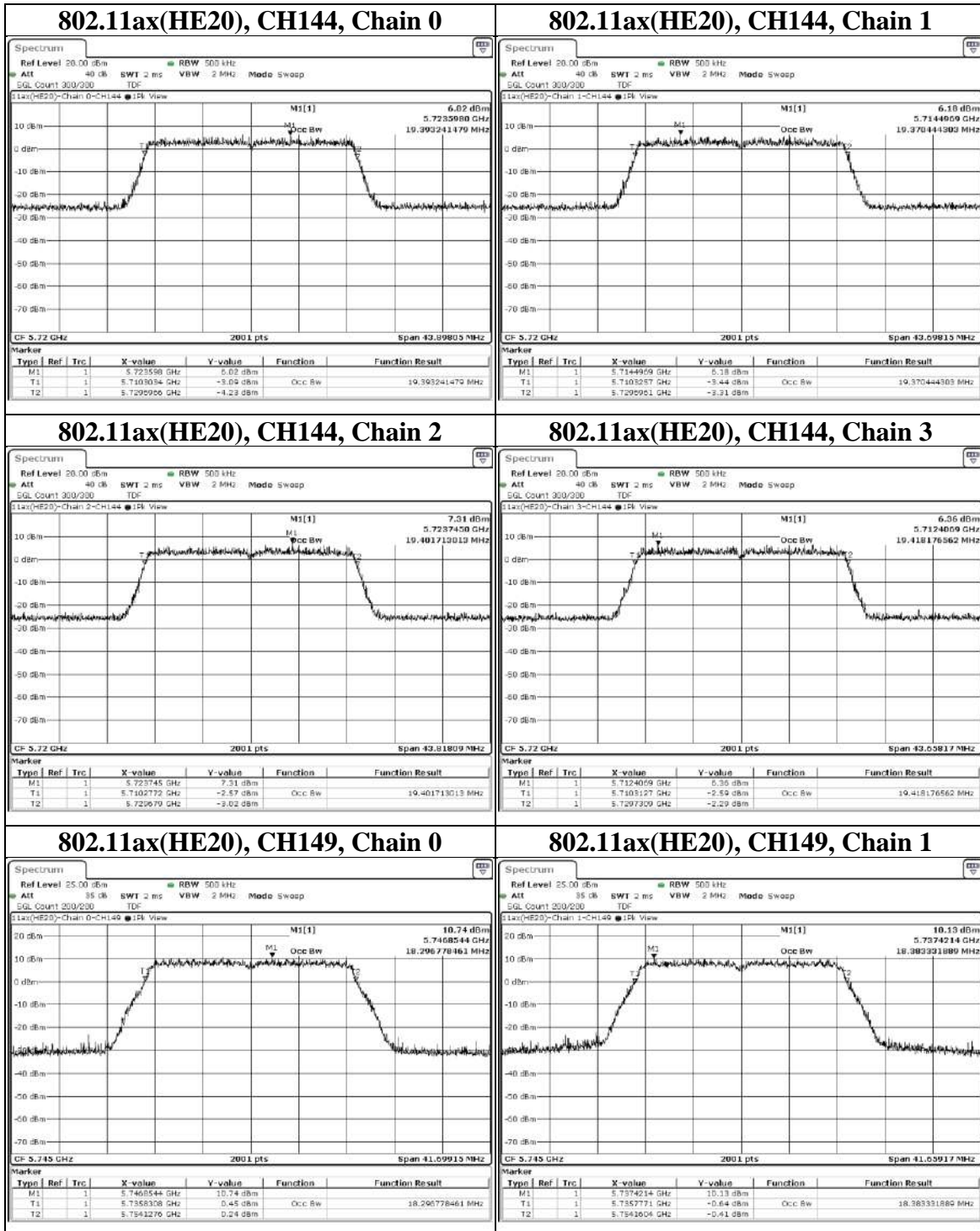


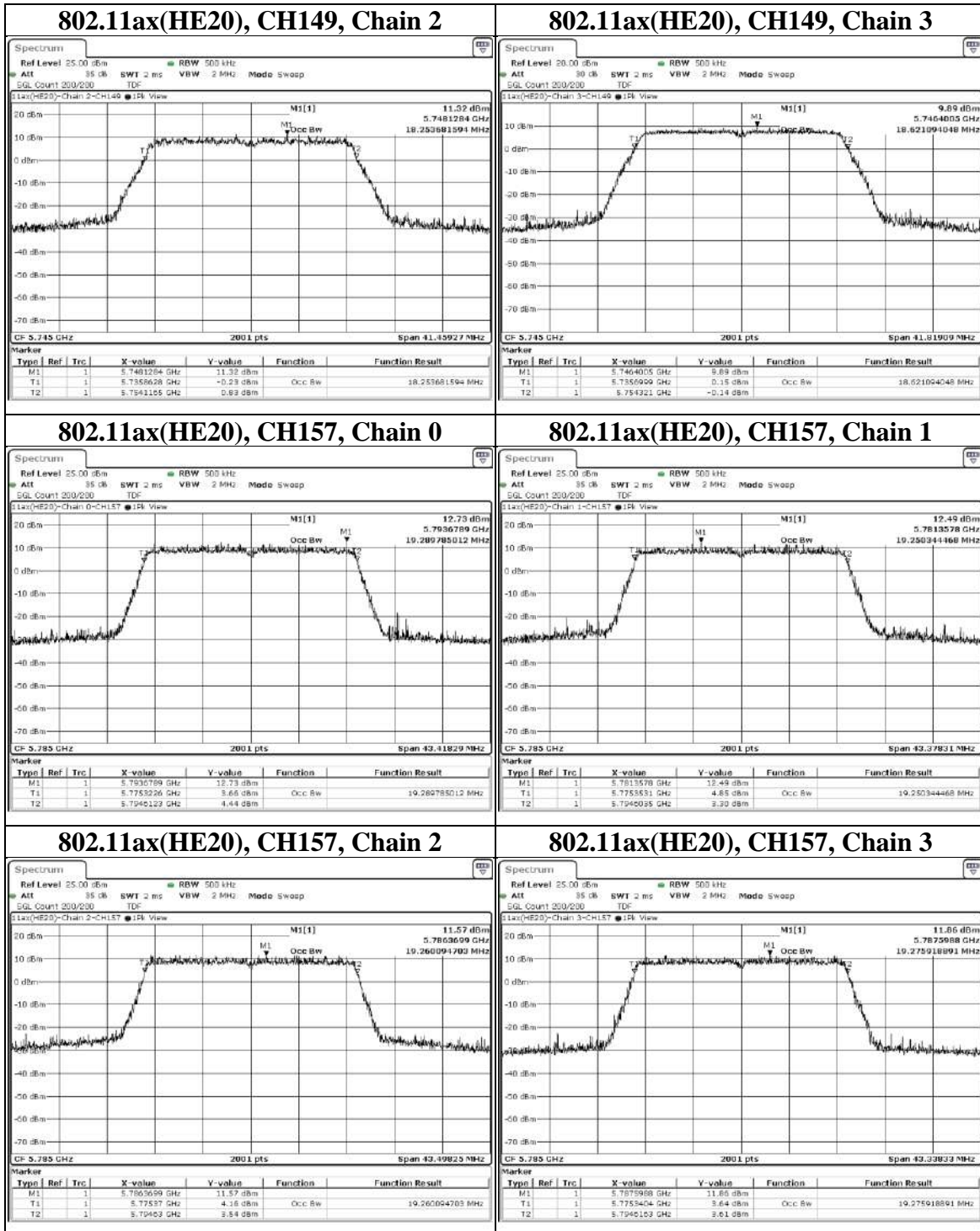


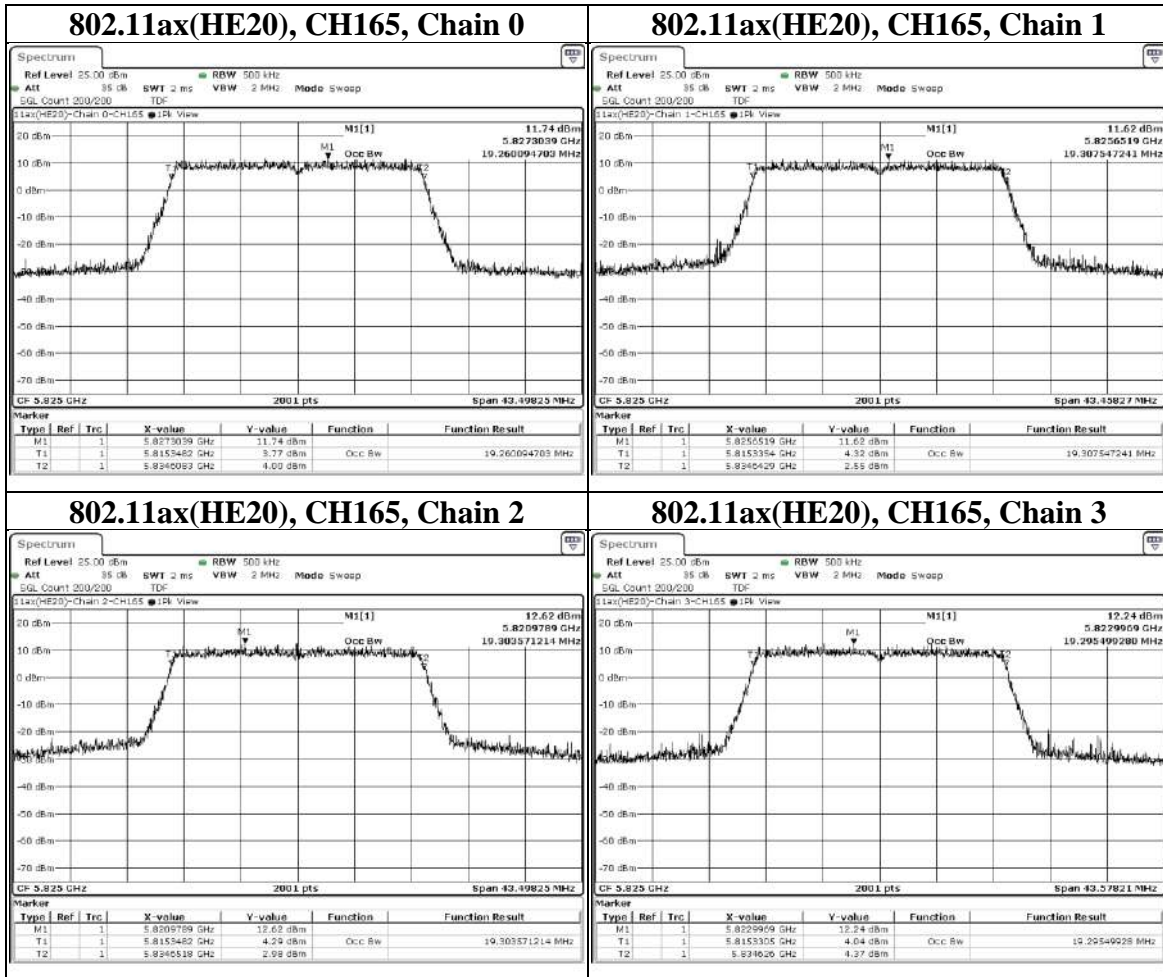












Mode	CH	Freq (MHz)	OBW (MHz)				Limit (MHz)	Result
			Chain 0	Chain 1	Chain 2	Chain 3		
802.11ax (HE40)	38	5190	36.635	36.558	36.596	36.597	N/A	PASS
	46	5230	37.903	37.898	37.937	37.942	N/A	PASS
	54	5270	37.902	37.902	37.94	37.98	N/A	PASS
	62	5310	37.901	37.941	37.903	37.94	N/A	PASS
	102	5510	36.597	36.596	36.52	36.635	N/A	PASS
	110	5550	38.165	38.202	38.164	38.162	N/A	PASS
	134	5670	37.977	38.014	38.13	38.425	N/A	PASS
	142 (U-NII-2C)	5710	34.045	34.125	34.066	34.026	N/A	PASS
	142 (U-NII-2C+U-NII-3)	5710	38.051	38.17	38.131	38.092	N/A	PASS
	142 (U-NII-3)	5710	4.005	4.045	4.066	4.066	N/A	PASS
	151	5755	38.051	38.092	38.09	38.049	N/A	PASS
	159	5795	38.425	38.053	38.463	38.46	N/A	PASS

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