

RADIO TEST REPORT

Product : Wi-Fi 7 AIW-173 module

Model Name : AIW-173BQ-GI1

Series Model : AIW-173LQ-GI1, AIW-173LQ-GI2, AIW-173BQ-GI2,
AIW-173HQ-GI1, AIW-173HQ-GI2

FCC ID : M82-AIW-173

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

Received Date : 2024/9/18

Test Date : 2024/9/19 ~ 2025/2/10

Issued Date : 2025/4/16

Applicant : Advantech Co Ltd
No. 1, Alley 20, Lane 26, Rueiguang Road Neihu District,
Taipei, Taiwan 114

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



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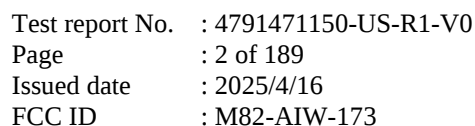
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Doc No: Form-ULID-004739 (DCS:17-EM-F0878) / 6.1



Original Test Report No.: 4791471150-US-R1-V0

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

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1. Attestation of Test Results

APPLICANT: Advantech Co Ltd
No. 1, Alley 20, Lane 26, Rueiguang Road Neihu District, Taipei,
Taiwan 114

MANUFACTURER: Advantech Co Ltd
No. 1, Alley 20, Lane 26, Rueiguang Road Neihu District, Taipei,
Taiwan 114

EUT DESCRIPTION: Wi-Fi 7 AIW-173 module

BRAND: ADVANTECH

MODEL: AIW-173BQ-GI1

SERIES MODEL: AIW-173LQ-GI1, AIW-173LQ-GI2, AIW-173BQ-GI2,
AIW-173HQ-GI1, AIW-173HQ-GI2

SAMPLE STAGE: Design Verification Test Sample

DATE of TESTED: 2024/9/19 ~ 2025/2/10

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 : 2025/4/16

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Date : 2025/4/16

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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) (1/2/3/4/5/9)	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.: 4791471150-US-R3-V0.

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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 and KDB 662911 D01 Multiple Transmitter Output v02r01.

4. Facilities and Accreditation

Test Location	Underwriters Laboratories Taiwan Co., Ltd.
Address	Building A, B and 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, Simple acceptance (Section 3.1.4 of IEC Guide 115) 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	3.1 dB
RF Conducted	9 kHz - 40GHz	2.3 dB
Radiated disturbance below 30MHz	9 kHz - 30 MHz	3.2 dB
Radiated disturbance below 1 GHz	30MHz ~ 1GHz	6.1 dB
Radiated disturbance above 1 GHz	1GHz ~ 40GHz	5.1 dB

6. Equipment under Test

6.1. Description of EUT

Product	Wi-Fi 7 AIW-173 module
Brand Name	ADVANTECH
Model Name	AIW-173BQ-GI1
Series Model	AIW-173LQ-GI1, AIW-173LQ-GI2, AIW-173BQ-GI2, AIW-173HQ-GI1, AIW-173HQ-GI2
Normal Voltage	3.3Vdc

Operating Frequency	5180 ~ 5240MHz, 5260 ~ 5320MHz, 5500 ~ 5720MHz, 5745 ~ 5825MHz
Modulation	4096QAM, 1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM / OFDMA
Transfer Rate	802.11a: up to 54 Mbps
	802.11n: up to MCS15
	802.11ac: up to MCS9
	802.11ax: up to MCS11
	802.11be: up to MCS13
Maximum Output Power	5180 ~ 5240 MHz: 21.85 dBm
	5260 ~ 5320 MHz: 21.69 dBm
	5500 ~ 5720 MHz: 21.62 dBm
	5745 ~ 5825 MHz: 21.20 dBm
Sample ID	Conducted Test:7620396
	Radiated Test:7620396

Note:

1. The models difference table as below:

Model	Different	
	Type	Bluetooth Interface
AIW-173LQ-GI1	LGA Module	Bluetooth USB control
AIW-173LQ-GI2		Bluetooth UART control
AIW-173BQ-GI1	M.2 type PCB board + LGA Module	Bluetooth USB control
AIW-173BQ-GI2		Bluetooth UART control
AIW-173HQ-GI1	PCIE type PCB board + LGA Module	Bluetooth USB control
AIW-173HQ-GI2		Bluetooth UART control

Remark:

- There are no circuit or layout differences in the LGA Module part across the three types.
- AIW-173LQ-GI1 and AIW-173LQ-GI2 have identical electrical characteristics.
- AIW-173BQ-GI1 and AIW-173BQ-GI2 have identical electrical characteristics.
- AIW-173HQ-GI1 and AIW-173HQ-GI2 have identical electrical characteristics.

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2. EUT provides a complete 2Tx port and 2Rx port. Please refer to the following working transmission conditions:

Modulation Mode	Tx/Rx Function	
802.11a	2Tx	2Rx
802.11n (HT20)	2Tx	2Rx
802.11n (HT40)	2Tx	2Rx
802.11ac (VHT20)	2Tx	2Rx
802.11ac (VHT40)	2Tx	2Rx
802.11ac (VHT80)	2Tx	2Rx
802.11ac (VHT160)	2Tx	2Rx
802.11ax (HE20)	2Tx	2Rx
802.11ax (HE40)	2Tx	2Rx
802.11ax (HE80)	2Tx	2Rx
802.11ax (HE160)	2Tx	2Rx
802.11be (EHT20)	2Tx	2Rx
802.11be (EHT40)	2Tx	2Rx
802.11be (EHT80)	2Tx	2Rx
802.11be (HE160)	2Tx	2Rx

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

*The modulation and bandwidth are similar for 802.11ax mode for HE20 / HE40 / HE80 / HE160 and 802.11be mode for EHT20 / EHT40 / EHT80 / EHT160, therefore investigated one worst case to representative mode in test report.

3. 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.

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6.2. Channel List

FOR 5180 ~ 5240MHz

4 channels are provided for 5G WLAN 20MHz bandwidth system:

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

2 channels are provided for 5G WLAN 40MHz bandwidth system:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	46	5230

1 channel are provided for 5G WLAN 80MHz bandwidth system:

Channel	Frequency (MHz)
42	5210

FOR 5260 ~ 5320MHz

4 channels are provided for 5G WLAN 20MHz bandwidth system:

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

2 channels are provided for 5G WLAN 40MHz bandwidth system:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
54	5270	62	5310

1 channel are provided for 5G WLAN 80MHz bandwidth system:

Channel	Frequency (MHz)
58	5290

1 saddle channel are provided for 5G WLAN 160MHz bandwidth system:

Channel	Frequency (MHz)
50	5250

FOR 5500 ~ 5720MHz

12 channels are provided for 5G WLAN 20MHz bandwidth system:

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

6 channels are provided for 5G WLAN 40MHz bandwidth system:

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

3 channel are provided for 5G WLAN 80MHz bandwidth system:

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

1 channel are provided for 5G WLAN 160MHz bandwidth system:

Channel	Frequency (MHz)
114	5570

FOR 5745 ~ 5825MHz:

5 channels are provided for 5G WLAN 20MHz bandwidth system:

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

2 channels are provided for 5G WLAN 40MHz bandwidth system:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755	159	5795

1 channel are provided for 5G WLAN 80MHz bandwidth system:

Channel	Frequency (MHz)
155	5775

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6.3. Test Condition

Test Item	Test Site No.	Environmental	Input Power	Test Date	Tested by
Antenna Port Conducted Measurement	SR4	20~25°C/ 56~69%RH	3.3Vdc	2024/09/23~ 2025/01/20	WaterNil Guan
Radiated Spurious Emission	966-2	22~26°C/ 62~68%RH	3.3Vdc	2024/09/19~ 2025/02/10	WaterNil Guan
AC power Line Conducted Emission	SR1	22°C/ 53%RH	120Vac/ 60Hz	2025/02/05	WaterNil Guan

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	Maximum Gain (dBi)	Ant. Type	Connector Type
1	Chain0+1	Advantech	AIW-512-C (1751000460-01)	2.87 dBi : 2400 ~ 2500 MHz 3.11 dBi : 5150 ~ 5850 MHz 3.22 dBi : 5925 ~ 7125 MHz	Dipole	RP-SMA Male
2	Chain0+1	Advantech	AIW-512-I (1751000651-01)	2.87 dBi : 2400 ~ 2500 MHz 3.11 dBi : 5150 ~ 5850 MHz 3.22 dBi : 5925 ~ 7125 MHz	Dipole	RP-SMA Male
3	Chain0+1	Advantech	1751000642-01	1.61 dBi : 2400 ~ 2500 MHz 3.68 dBi : 5150 ~ 5850 MHz 4.06 dBi : 5925 ~ 7125 MHz	Dipole	RP-SMA Male
4	Chain0+1	Advantech	AIW-511 (1751000342-01)	2.28 dBi : 2400 ~ 2500 MHz 2.64 dBi : 5150 ~ 5850 MHz 3.28 dBi : 5925 ~ 7125 MHz	Dipole	RP-SMA Male
5	Chain0+1	Advantech	AIW-513 (1751000717-01)	1.48 dBi : 2400 ~ 2500 MHz 3.58 dBi : 5150 ~ 5850 MHz 4.04 dBi : 5925 ~ 7125 MHz	Dipole	RP-SMA Male
6	Chain0+1	Advantech	AIW-514	ANT0: 2.59 dBi @ 2400 – 2500 MHz 3.58 dBi @ 5150 – 5850 MHz 3.94 dBi @ 5925 – 7125 MHz ANT1: 2.60 dBi @ 2400 – 2500 MHz 3.51 dBi @ 5150 – 5850 MHz 3.91 dBi @ 5925 – 7125 MHz	Dipole	RP-SMA-Male

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

Test Item	Mode	Modulation Technology	Modulation Type	Available Channel	Test Channel	Data Rate
Radiated Bandedge	802.11a	5180-5240	OFDM	36 to 48	36, 44, 48	6 Mbps
	802.11ac20			36 to 48	36, 44, 48	MCS0 Nss1
	802.11ac40			38 to 46	38, 46	MCS0 Nss1
	802.11ac80			42	42	MCS0 Nss1
	802.11be20			36 to 48	36, 44, 48	MCS0 Nss1
	802.11be40			38 to 46	38, 46	MCS0 Nss1
	802.11be80			42	42	MCS0 Nss1
	802.11a	5260-5320	OFDM	52 to 64	52, 60, 64	6 Mbps
	802.11ac20			52 to 64	52, 60, 64	MCS0 Nss1
	802.11ac40			54 to 62	54, 62	MCS0 Nss1
	802.11ac80			58	58	MCS0 Nss1
	802.11ac160			50	50	MCS0 Nss1
	802.11be20			52 to 64	52, 60, 64	MCS0 Nss1
	802.11be40			54 to 62	54, 62	MCS0 Nss1
	802.11be80			58	58	MCS0 Nss1
	802.11be160			50	50	MCS0 Nss1
	802.11a	5500-5720	OFDM	100 to 144	100, 116, 140, 144	6 Mbps
	802.11ac20			100 to 144	100, 116, 140, 144	MCS0 Nss1
	802.11ac40			102 to 142	102, 110, 134, 142	MCS0 Nss1
	802.11ac80			106 to 138	106, 122, 138	MCS0 Nss1
	802.11ac160			114	114	MCS0 Nss1
	802.11be20			100 to 144	100, 116, 140, 144	MCS0 Nss1
	802.11be40			102 to 142	102, 110, 134, 142	MCS0 Nss1
	802.11be80			106 to 138	106, 122, 138	MCS0 Nss1
	802.11be160			114	114	MCS0 Nss1
	802.11a	5745-5825	OFDM	149 to 165	149, 157, 165	6 Mbps
	802.11ac20			149 to 165	149, 157, 165	MCS0 Nss1
	802.11ac40			151 to 159	151, 159	MCS0 Nss1
	802.11ac80			155	155	MCS0 Nss1
	802.11be20			149 to 165	149, 157, 165	MCS0 Nss1
	802.11be40			151 to 159	151, 159	MCS0 Nss1
	802.11be80			155	155	MCS0 Nss1
Radiated Emissions (Above 1GHz)	802.11a	5180-5240	OFDM	36 to 48	36, 44, 48	6 Mbps
	802.11a	5260-5320		52 to 64	52, 60, 64	6 Mbps
	802.11a	5500-5720		100 to 144	100, 116, 140, 144	6 Mbps
	802.11a	5745-5825		149 to 165	149, 157, 165	6 Mbps
	RX_802.11a	5180-5240		36 to 48	44	6 Mbps

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Test Item	Mode	Modulation Technology	Modulation Type	Available Channel	Test Channel	Data Rate
Radiated Emissions (Below 1GHz)	802.11a	5180-5240	OFDM	36 to 48	44	6 Mbps
	RX_802.11a	5180-5240		36 to 48	44	6 Mbps
AC Power Line Conducted Emission	802.11be20	5180-5240	OFDM	36 to 48	44	1 Mbps
	RX_802.11be20	5180-5240		36 to 48	44	1 Mbps
Antenna Port Conducted Measurement	802.11a	5180-5240	OFDM	36 to 48	36, 44, 48	6 Mbps
	802.11ac20			36 to 48	36, 44, 48	MCS0 Nss1
	802.11ac40			38 to 46	38, 46	MCS0 Nss1
	802.11ac80			42	42	MCS0 Nss1
	802.11be20			36 to 48	36, 44, 48	MCS0 Nss1
	802.11be40			38 to 46	38, 46	MCS0 Nss1
	802.11be80			42	42	MCS0 Nss1
	802.11a	5260-5320	OFDM	52 to 64	52, 60, 64	6 Mbps
	802.11ac20			52 to 64	52, 60, 64	MCS0 Nss1
	802.11ac40			54 to 62	54, 62	MCS0 Nss1
	802.11ac80			58	58	MCS0 Nss1
	802.11ac160			50	50	MCS0 Nss1
	802.11be20			52 to 64	52, 60, 64	MCS0 Nss1
	802.11be40			54 to 62	54, 62	MCS0 Nss1
	802.11be80			58	58	MCS0 Nss1
	802.11be160			50	50	MCS0 Nss1
	802.11a	5500-5720	OFDM	100 to 144	100, 116, 140, 144	6 Mbps
	802.11ac20			100 to 144	100, 116, 140, 144	MCS0 Nss1
	802.11ac40			102 to 142	102, 110, 134, 142	MCS0 Nss1
	802.11ac80			106 to 138	106, 122, 138	MCS0 Nss1
	802.11ac160			114	114	MCS0 Nss1
	802.11be20			100 to 144	100, 116, 140, 144	MCS0 Nss1
	802.11be40			102 to 142	102, 110, 134, 142	MCS0 Nss1
	802.11be80			106 to 138	106, 122, 138	MCS0 Nss1
	802.11be160			114	114	MCS0 Nss1
	802.11a	5745-5825	OFDM	149 to 165	149, 157, 165	6 Mbps
	802.11ac20			149 to 165	149, 157, 165	MCS0 Nss1
	802.11ac40			151 to 159	151, 159	MCS0 Nss1
	802.11ac80			155	155	MCS0 Nss1
	802.11be20			149 to 165	149, 157, 165	MCS0 Nss1
	802.11be40			151 to 159	151, 159	MCS0 Nss1
	802.11be80			155	155	MCS0 Nss1

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- The EUT consists of six different models, all of which share the same LGA Module. Consequently, the fundamental level of the EUT was investigated across these six models. It was determined that the AIW-173BQ-GI1 represented the worst-case scenario and was selected as the representative test model documented in this report.
- The antennas No.2 has the highest and worst gain at 2.4GHz band and the antennas No.3 has the highest gain at 5GHz/6GHz band, therefore, the Radiated Emissions of the EUT was tested in two antennas, and it was found antenna No.2 have worst-case, and thus, the Antenna No.2 was selected representative test data documented in this report.
- 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 radiated emissions below 1 GHz, the worst-case mode was determined from all series. It was found that the AIW-173BQ-GI1 represented the worst-case. Therefore, this model was selected for the final test.
- The radiated spurious emission test was performed in all test modes. The worst case was 802.11a, and therefore, only the worst case data is shown in this report to represent all test modes.
- In the transmit mode, 802.11be20 channel 44 has the highest RF output power. Therefore, the AC conduction were performed using this worst-case mode.
- In the transmit mode, 802.11a channel 44 has the worst case of Tx spurious emission (above 1GHz). Therefore, all final tests for the spurious emission (below 1GHz) were performed using this worst-case mode.
- 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.
- 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).

Simultaneously transmission condition:

Condition	Technology		
1	WLAN (2.4GHz)	WLAN (5GHz)	-
2	BT	WLAN (5GHz)	-
3	BT	WLAN (2.4GHz)	WLAN (5GHz)

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

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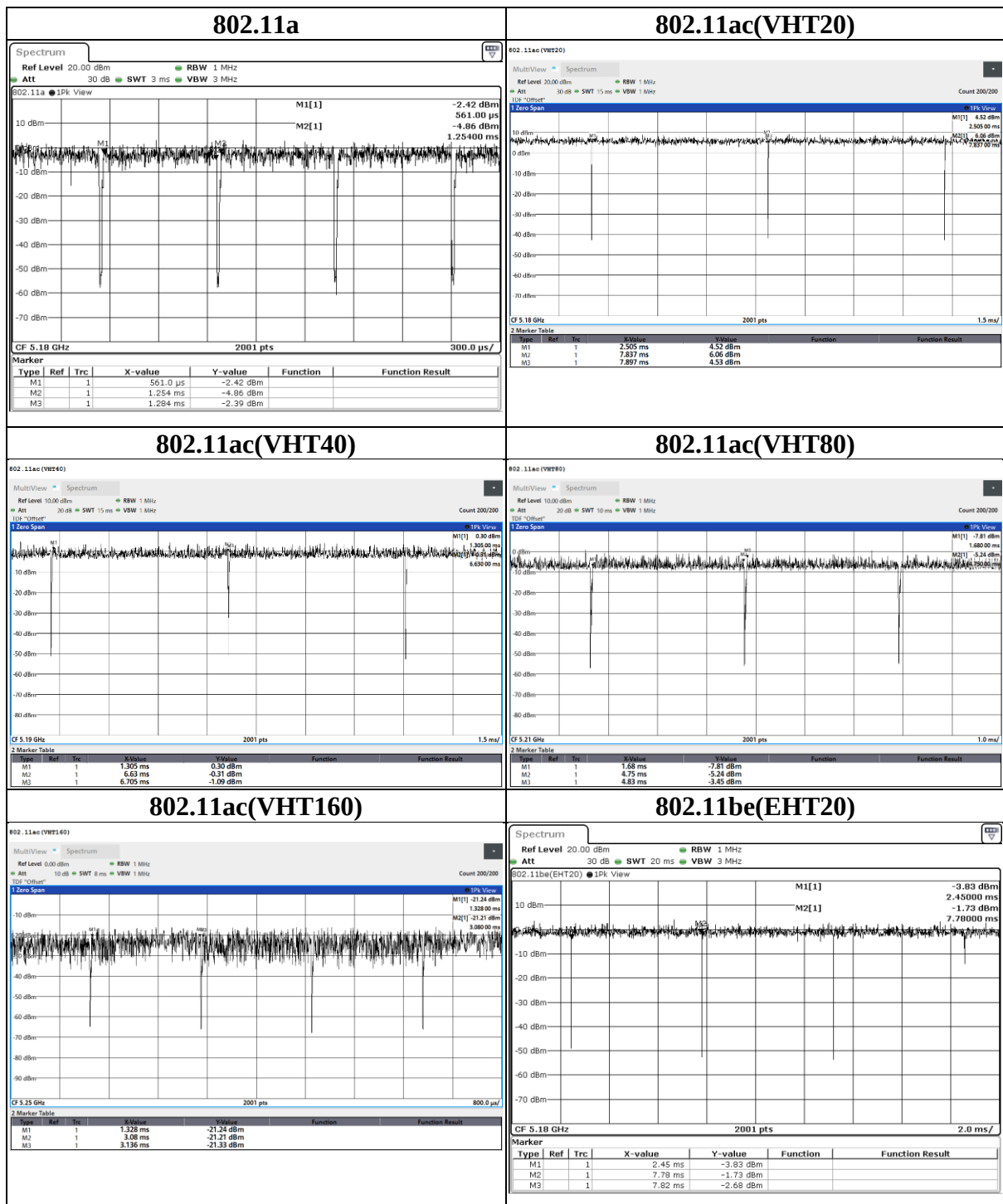
Telephone : +886-2-7737-3000

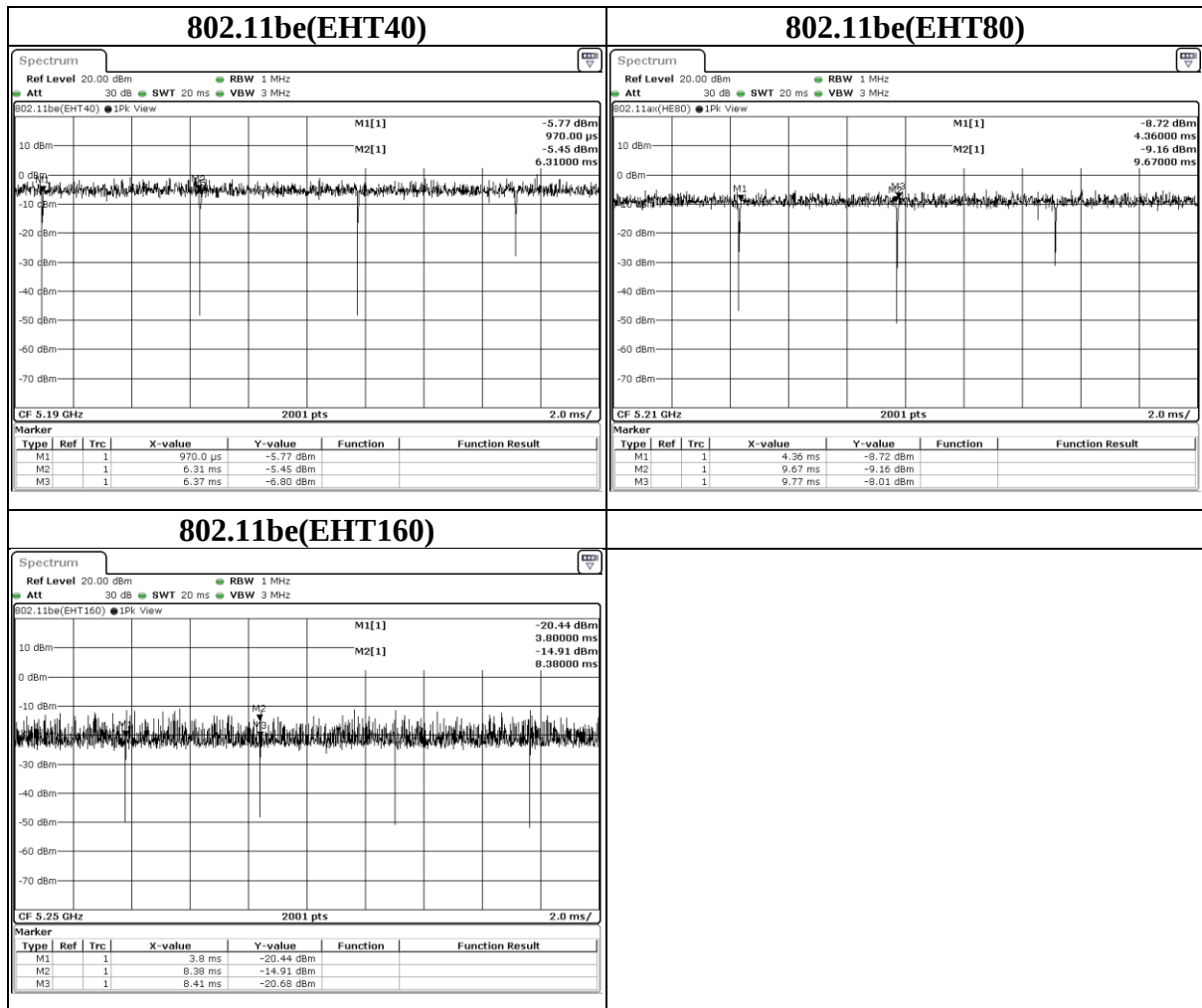
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6.6. Duty cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle	Duty Factor (dB)	VBW Set (above 1GHz)
802.11a	0.693	0.723	0.9585	0.18	2kHz
802.11ac(VHT20)	5.332	5.392	0.9889	N/A	10Hz
802.11ac(VHT40)	5.325	5.400	0.9861	N/A	10Hz
802.11ac(VHT80)	3.070	3.150	0.9746	0.11	510Hz
802.11ac(VHT160)	1.752	1.808	0.9690	0.14	1kHz
802.11be(EHT20)	5.330	5.370	0.9926	N/A	10Hz
802.11be(EHT40)	5.340	5.400	0.9889	N/A	10Hz
802.11be(EHT80)	5.310	5.410	0.9815	N/A	10Hz
802.11be(EHT160)	4.580	4.610	0.9935	N/A	10Hz





7. Test Equipment

Test Equipment List					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Expired date
Radiated Spurious Emission					
Spectrum Analyzer	Keysight	N9010A	MY56070827	2024/3/29	2025/3/28
EMI Test Receiver	Rohde & Schwarz	ESR7	101754	2023/11/22	2024/11/21
				2024/12/24	2025/12/23
Loop Antenna	ETS lindgren	6502	00213440	2023/12/13	2024/12/12
				2024/12/11	2025/12/10
Trilog-Broadband Antenna with 5dB Attenuator	Schwarzbeck & EMCI	VULB 9168 & N-6-05	774 & AT-N0538	2024/1/5	2025/1/4
				2024/12/30	2025/12/29
Horn Antenna (1-18 GHz)	Schwarzbeck	BBHA 9120 D	01690	2023/12/8	2024/12/7
				2024/11/27	2025/11/26
Horn Antenna (18-40 GHz)	Schwarzbeck	BBHA 9170	781	2023/12/27	2024/12/26
				2024/12/18	2025/12/17
Preamplifier (30-1000 MHz)	EMCI	EMC330E	980405	2024/5/28	2025/5/27
Preamplifier (1-18 GHz)	EMCI	EMC051835BE	980406	2024/1/23	2025/1/22
				2025/1/13	2026/1/12
Preamplifier (18-40GHz)	EMCI	EMC184040SEE	980426	2024/4/16	2025/4/15
Cables (9k-18 GHz)	Hanyitek	K1K50-UP0264-K1K50-2500	170214-4 & 170425-2	2023/11/29	2024/11/28
				2024/11/22	2025/11/21
Cables (18-40GHz)	Hanyitek	K1K50-UP0264-K1K50-2500	170214-1 & 170214-2	2023/11/29	2024/11/28
				2024/11/22	2025/11/21

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Test Equipment List					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Expired date
Antenna Port Conducted Measurement					
Signal Analyzer	Rohde & Schwarz	FSVA3044	101281	2024/3/18	2025/3/17
Signal Analyzer	Rohde & Schwarz	FSV40	101490	2024/7/1	2025/6/30
Attenuator	EMCI	EMC-40ATK2W10	17002	2023/11/15	2024/11/14
				2024/11/13	2025/11/12
USB Power Sensor	Anritsu	MA24408A	12031	2024/7/13	2025/7/12
Temperature & Humidity Test Chamber	GIANT FORCE	GTH-150- 40-CP-AR	MAA1701-010	2024/3/6	2025/3/5
AC power Line Conducted Emission					
EMI Test Receiver	Rohde & Schwarz	ESR7	101753	2024/10/1	2025/9/30
Two-Line V-Network	Rohde & Schwarz	ENV216	102136	2024/5/14	2025/5/13
Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	2024/8/29	2025/8/28
Cables	TITAN	CFD200	T0732ACFD 20020A300-2	2024/5/14	2025/5/13

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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8. Description of Test Setup

Tx Mode

Support Equipment

ID	Equipment	Brand Name	Model Name	S/N	Remark
A	Host	Advantech	AIMB-219	N/A	Supplied by Client
B	Test Tool (console board)	Advantech	Advantech	N/A	Supplied by Client

I/O Cables

ID	Equipment	Brand Name	Model Name	Length (m)	Remark
1	Cable	ADTLink	R11SF-F	0.5	Supplied by Client
2	Test Tool (console cable)	Advantech	Advantech	0.5	Supplied by Client

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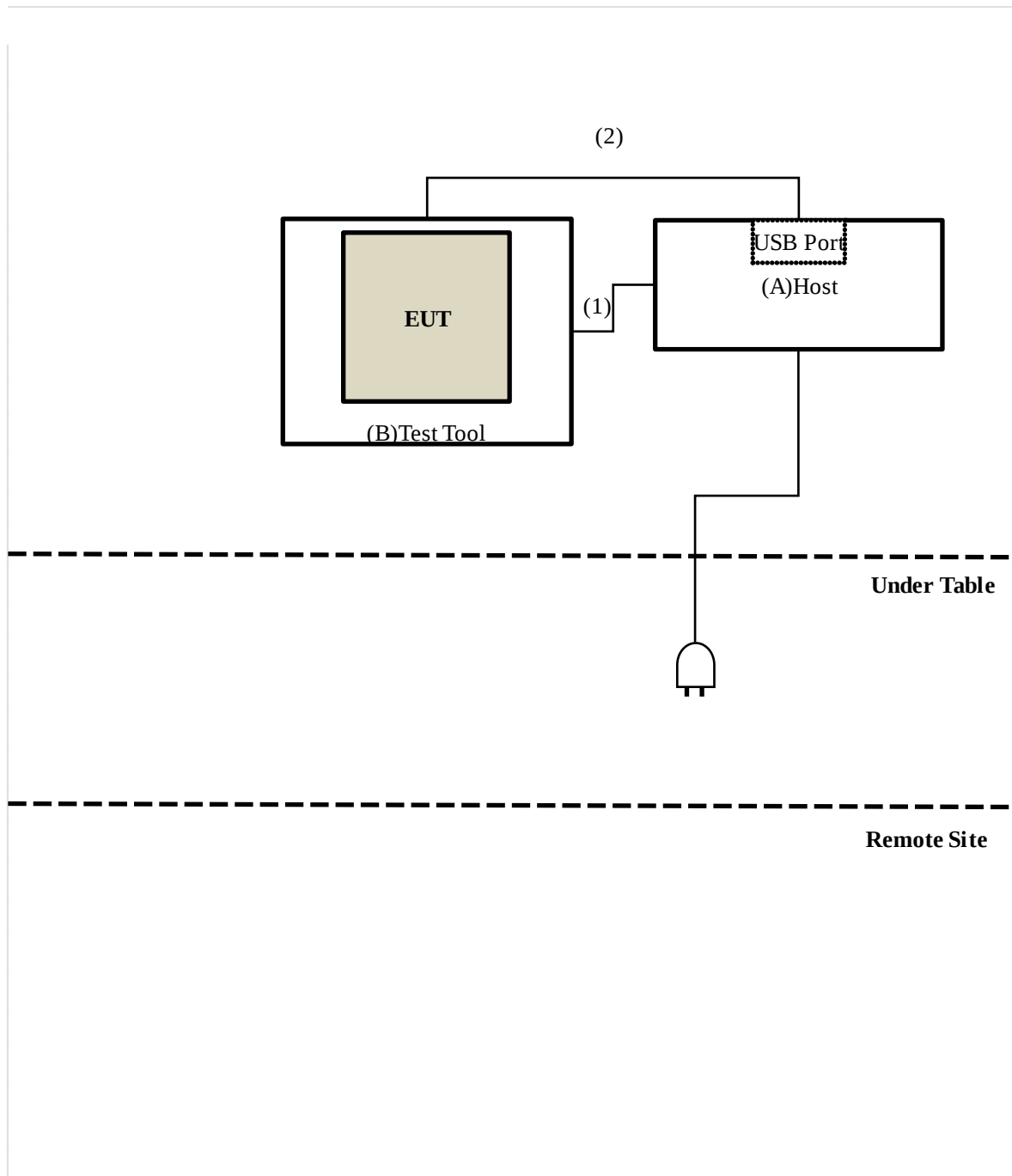
Doc No: Form-ULID-004739 (DCS:17-EM-F0878) / 6.1

Test Setup

Controlled using a bespoke application (QRCT version 4.0.2.11.0) 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

Tx Mode



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9. Test Results

9.1. 6dB Bandwidth

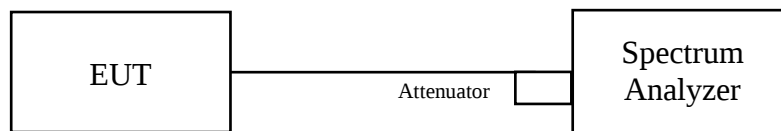
Requirements

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.
- The plot of the test result only shows the worst case of channels as a representative.

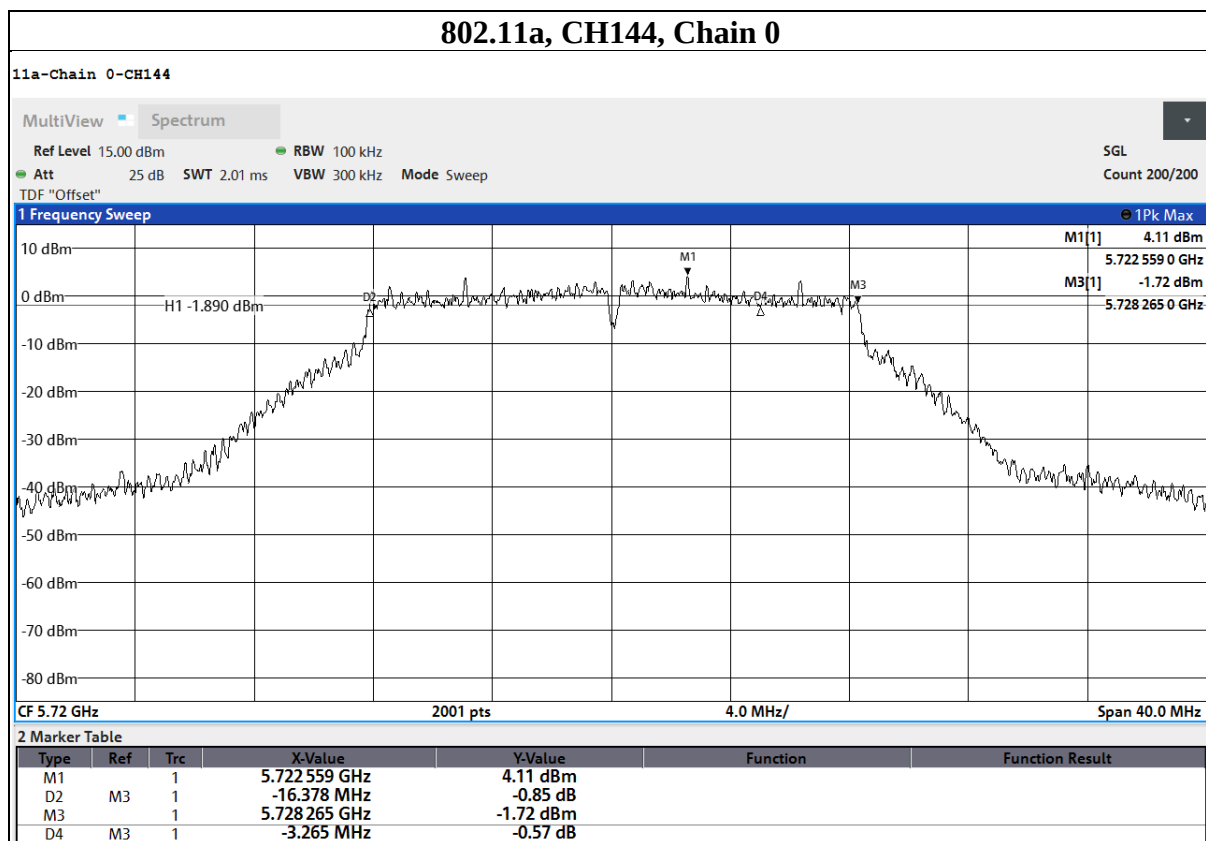
Test Setup



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	Chain 1		
802.11a	144 (U-NII-2C)	5720	13.113	13.054	0.5	PASS
	144 (U-NII-2C+U-NII-3)	5720	16.378	16.337	0.5	PASS
	144 (U-NII-3)	5720	3.265	3.283	0.5	PASS
	149	5745	16.088	16.34	0.5	PASS
	157	5785	15.962	15.693	0.5	PASS
	165	5825	15.669	15.965	0.5	PASS



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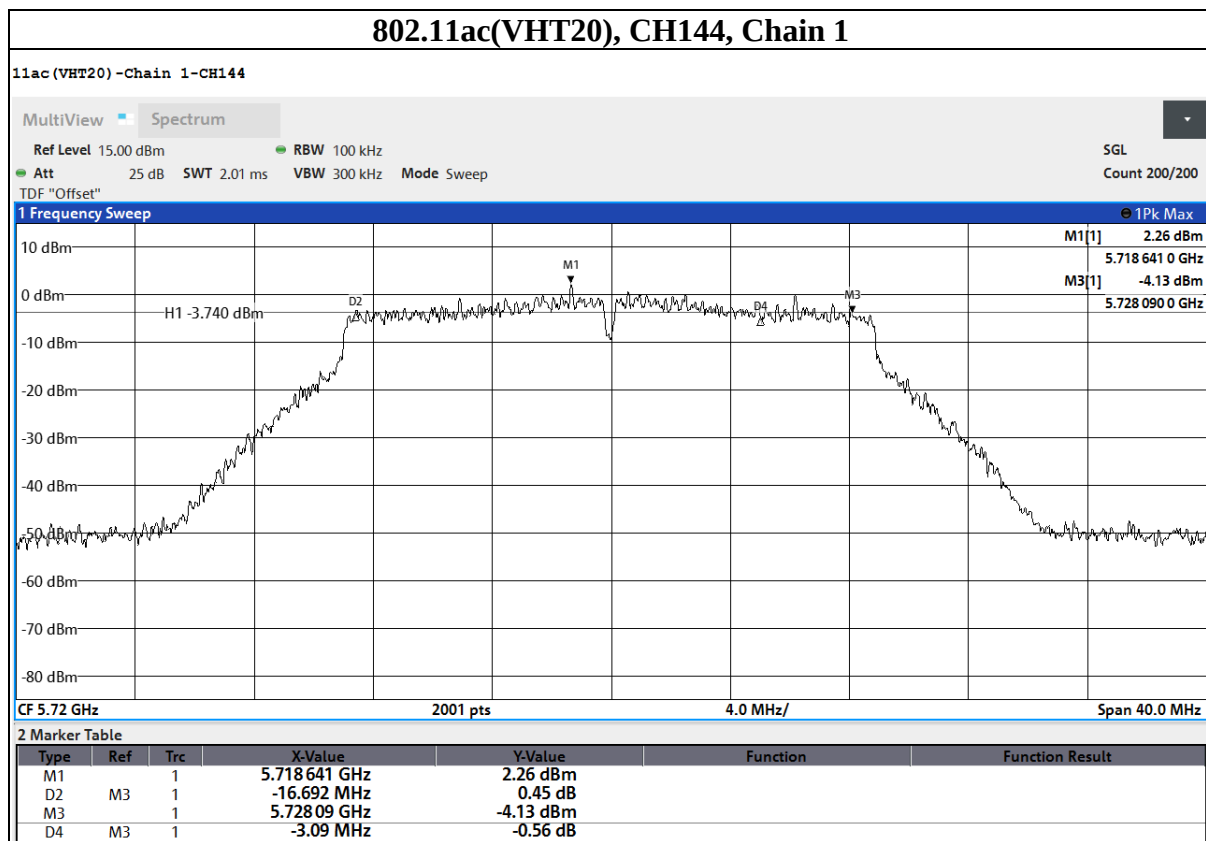
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Telephone : +886-2-7737-3000

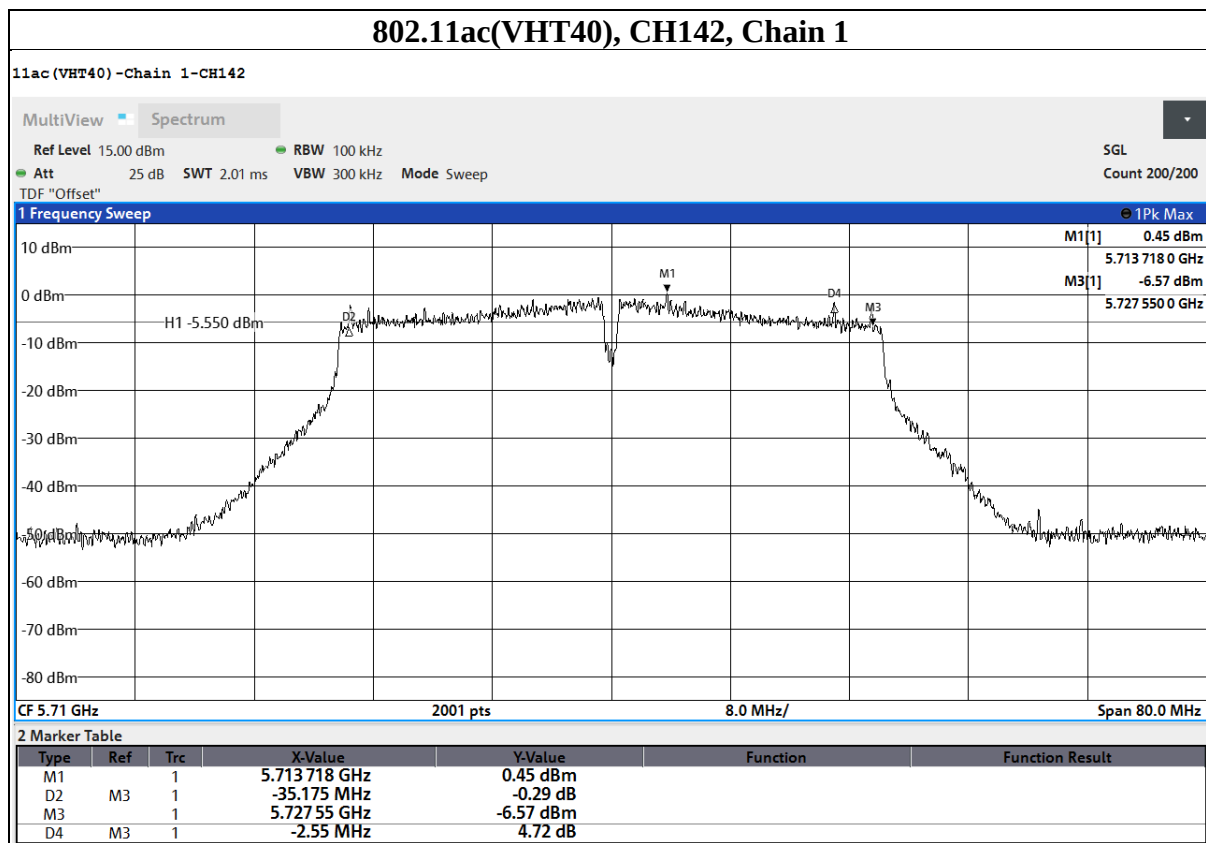
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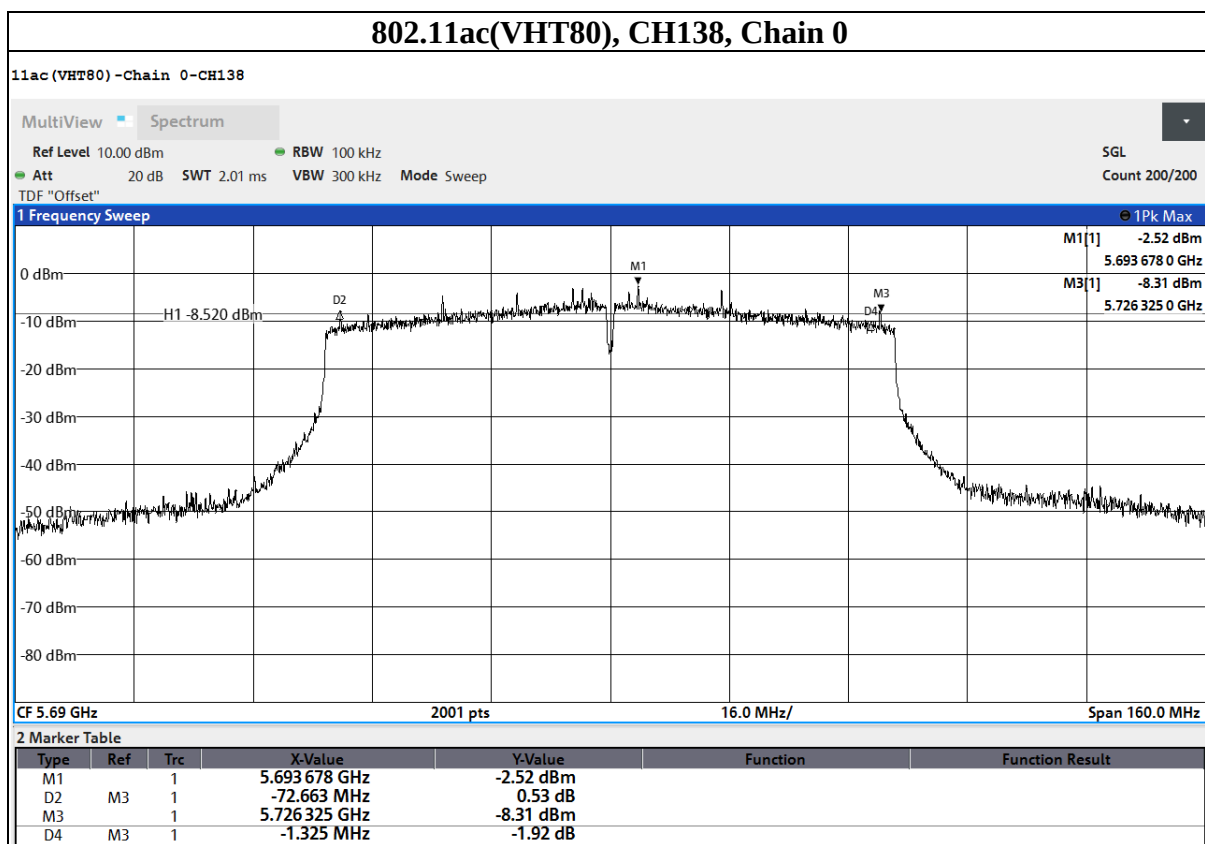
Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT20)	144 (U-NII-2C)	5720	13.874	13.602	0.5	PASS
	144 (U-NII-2C+U-NII-3)	5720	17.615	16.692	0.5	PASS
	144 (U-NII-3)	5720	3.741	3.09	0.5	PASS
	149	5745	17.209	15.09	0.5	PASS
	157	5785	17.554	15.065	0.5	PASS
	165	5825	16.925	17.6	0.5	PASS



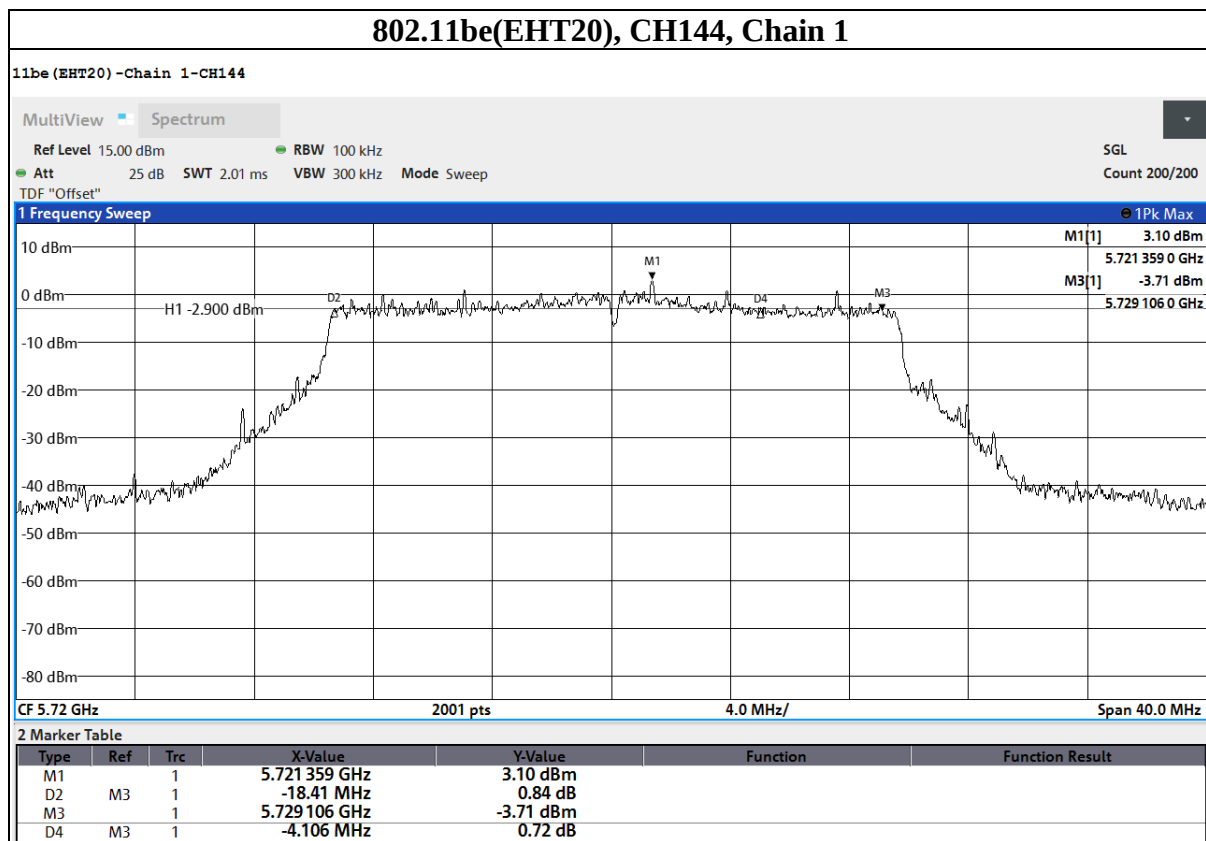
Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT40)	142 (U-NII-2C)	5710	33.164	32.625	0.5	PASS
	142 (U-NII-2C+U-NII-3)	5710	35.904	35.175	0.5	PASS
	142 (U-NII-3)	5710	2.74	2.55	0.5	PASS
	151	5755	33.156	36.05	0.5	PASS
	159	5795	30.127	23.915	0.5	PASS



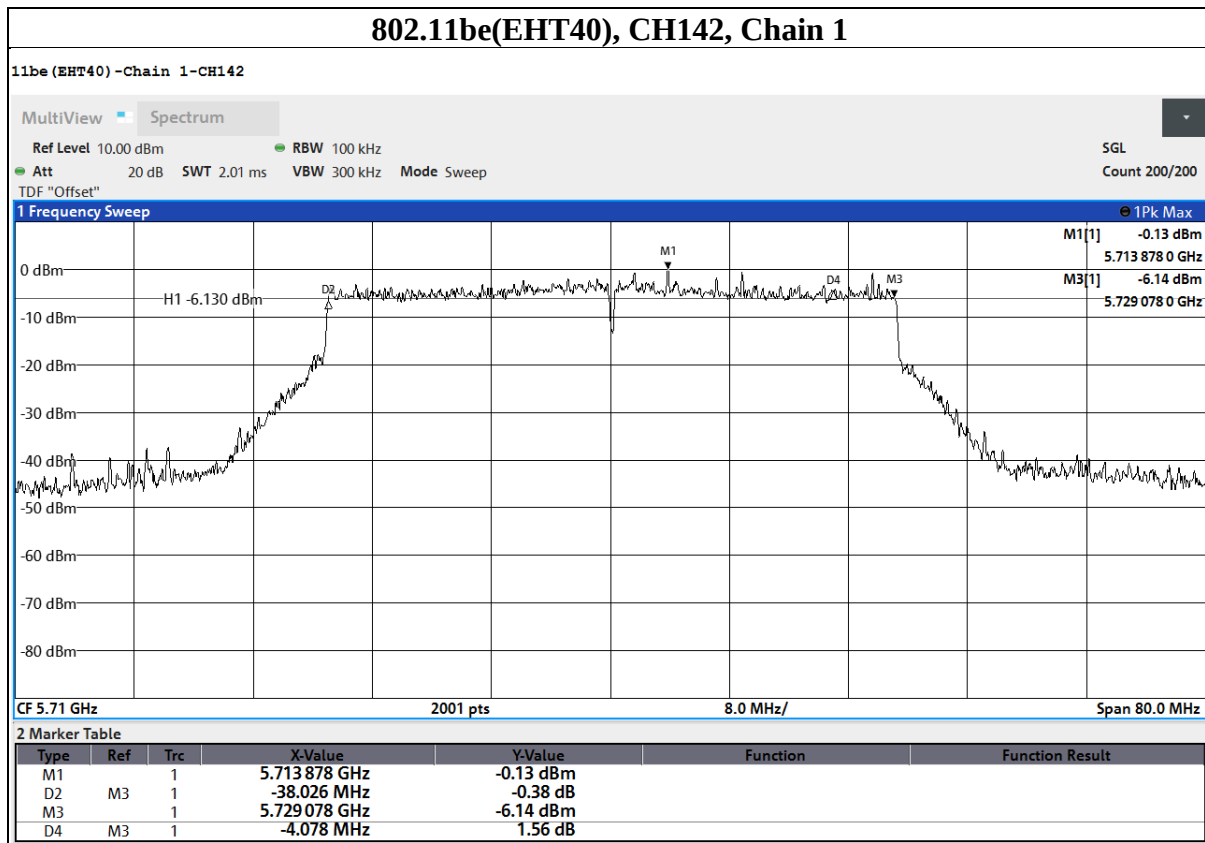
Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT80)	138 (U-NII-2C)	5690	71.338	67.584	0.5	PASS
	138 (U-NII-2C+U-NII-3)	5690	72.663	70.124	0.5	PASS
	138 (U-NII-3)	5690	1.325	2.54	0.5	PASS
	155	5775	76.361	68.93	0.5	PASS



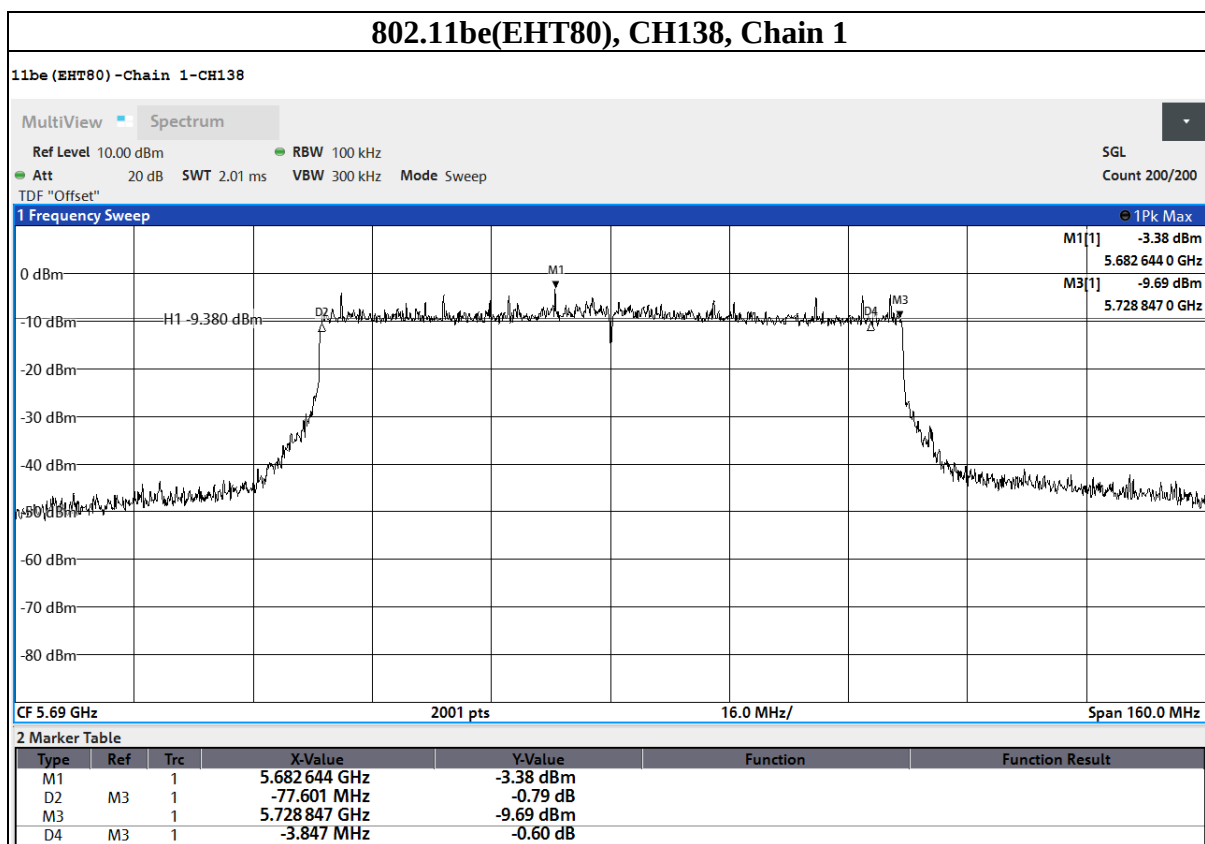
Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11be(EHT20)	144 (U-NII-2C)	5720	14.413	14.304	0.5	PASS
	144 (U-NII-2C+U-NII-3)	5720	18.984	18.41	0.5	PASS
	144 (U-NII-3)	5720	4.571	4.106	0.5	PASS
	149	5745	18.704	18.874	0.5	PASS
	157	5785	19.057	18.748	0.5	PASS
	165	5825	18.453	18.815	0.5	PASS



Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11be(EHT40)	142 (U-NII-2C)	5710	34.068	33.948	0.5	PASS
	142 (U-NII-2C+U-NII-3)	5710	38.269	38.026	0.5	PASS
	142 (U-NII-3)	5710	4.201	4.078	0.5	PASS
	151	5755	37.896	37.336	0.5	PASS
	159	5795	37.984	38.041	0.5	PASS



Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11be(EHT80)	138 (U-NII-2C)	5690	73.833	73.754	0.5	PASS
	138 (U-NII-2C+U-NII-3)	5690	77.966	77.601	0.5	PASS
	138 (U-NII-3)	5690	4.133	3.847	0.5	PASS
	155	5775	78.03	78.087	0.5	PASS

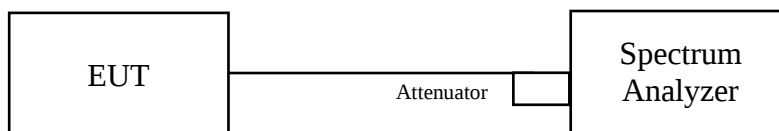


9.2. 26dB Bandwidth

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%.
- The plot of the test result only shows the worst case of channels as a representative.

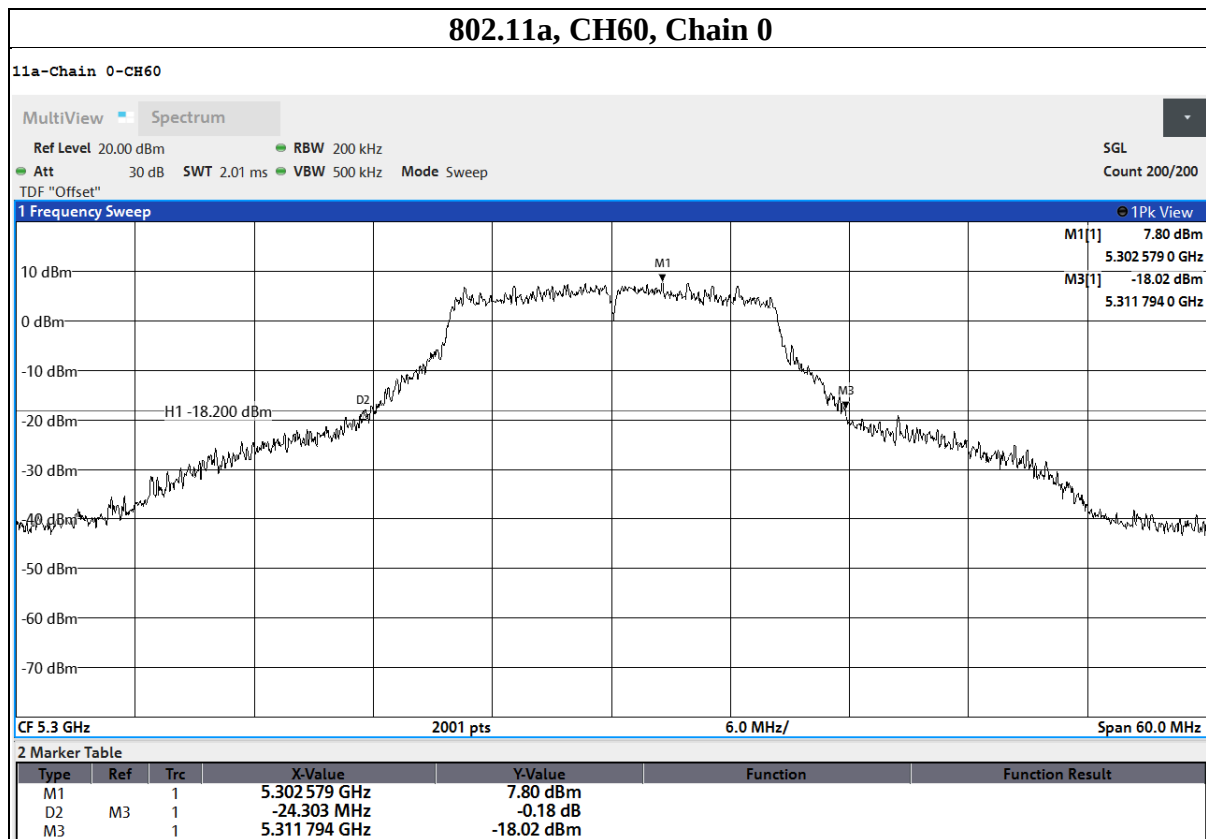
Test Setup



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	Chain 1		
802.11a	36	5180	23.238	22.265	N/A	PASS
	44	5220	22.668	22.376	N/A	PASS
	48	5240	23.896	22.437	N/A	PASS
	52	5260	23.575	21.946	N/A	PASS
	60	5300	24.303	22.147	N/A	PASS
	64	5320	23.088	22.231	N/A	PASS
	100	5500	22.872	22.184	N/A	PASS
	116	5580	22.936	22.425	N/A	PASS
	140	5700	22.605	22.168	N/A	PASS
	144 (U-NII-2C)	5720	16.32	16.375	N/A	PASS
	144 (U-NII-2C+U-NII-3)	5720	22.819	22.939	N/A	PASS
	144 (U-NII-3)	5720	6.499	6.564	N/A	PASS



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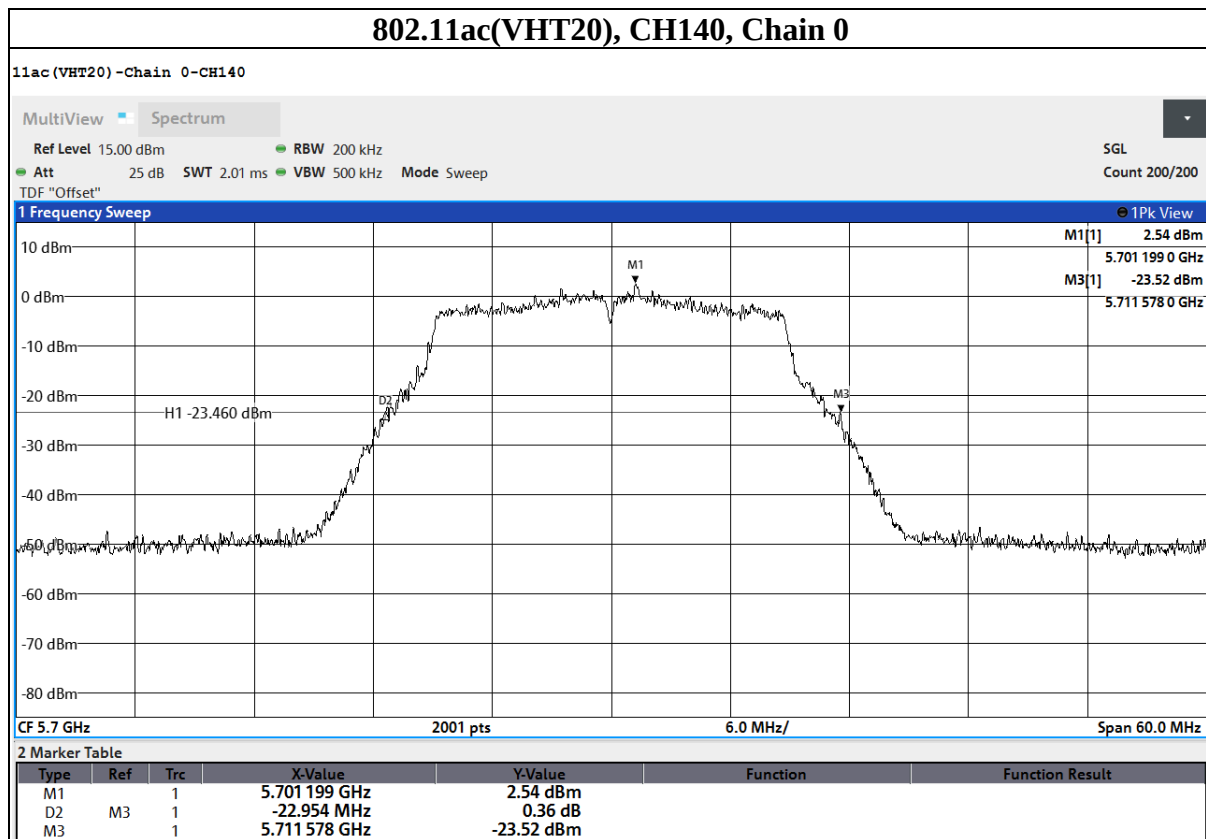
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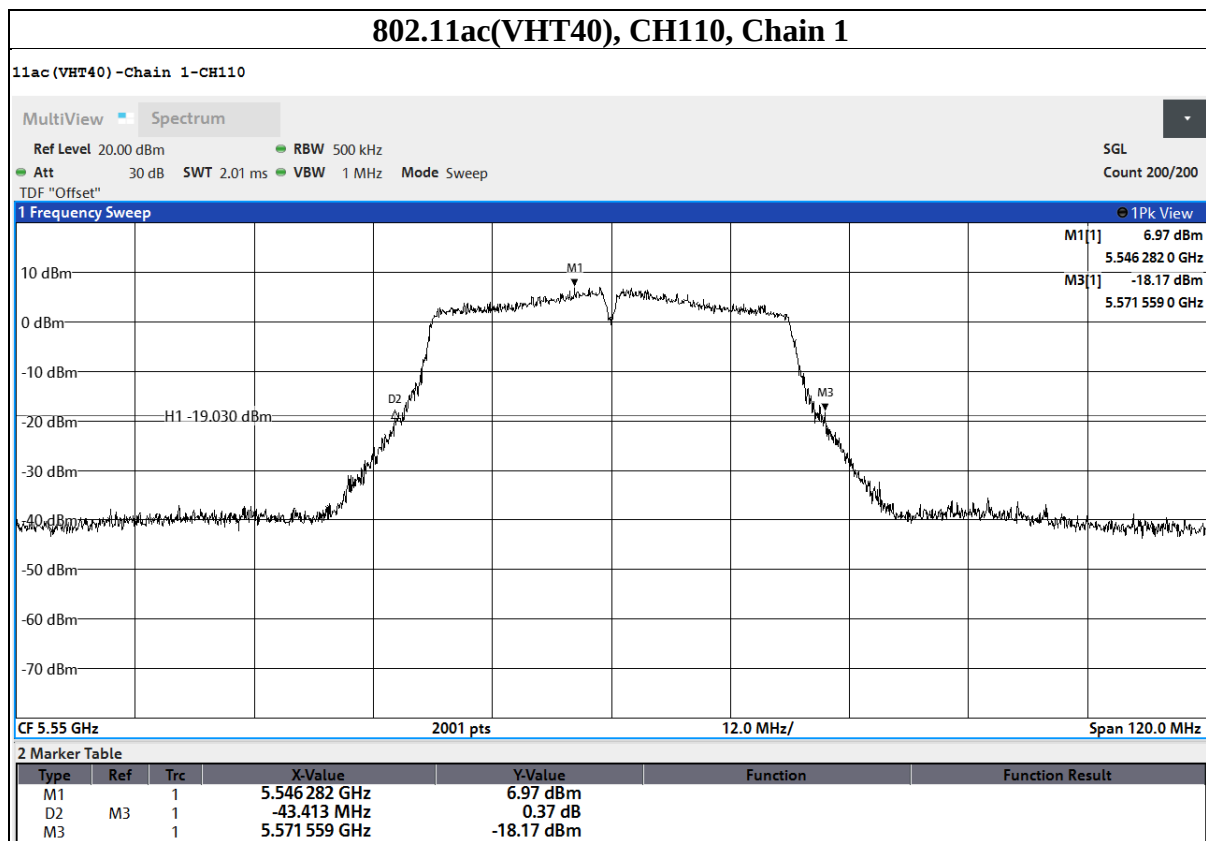
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Doc No: Form-ULID-004739 (DCS:17-EM-F0878) / 6.1

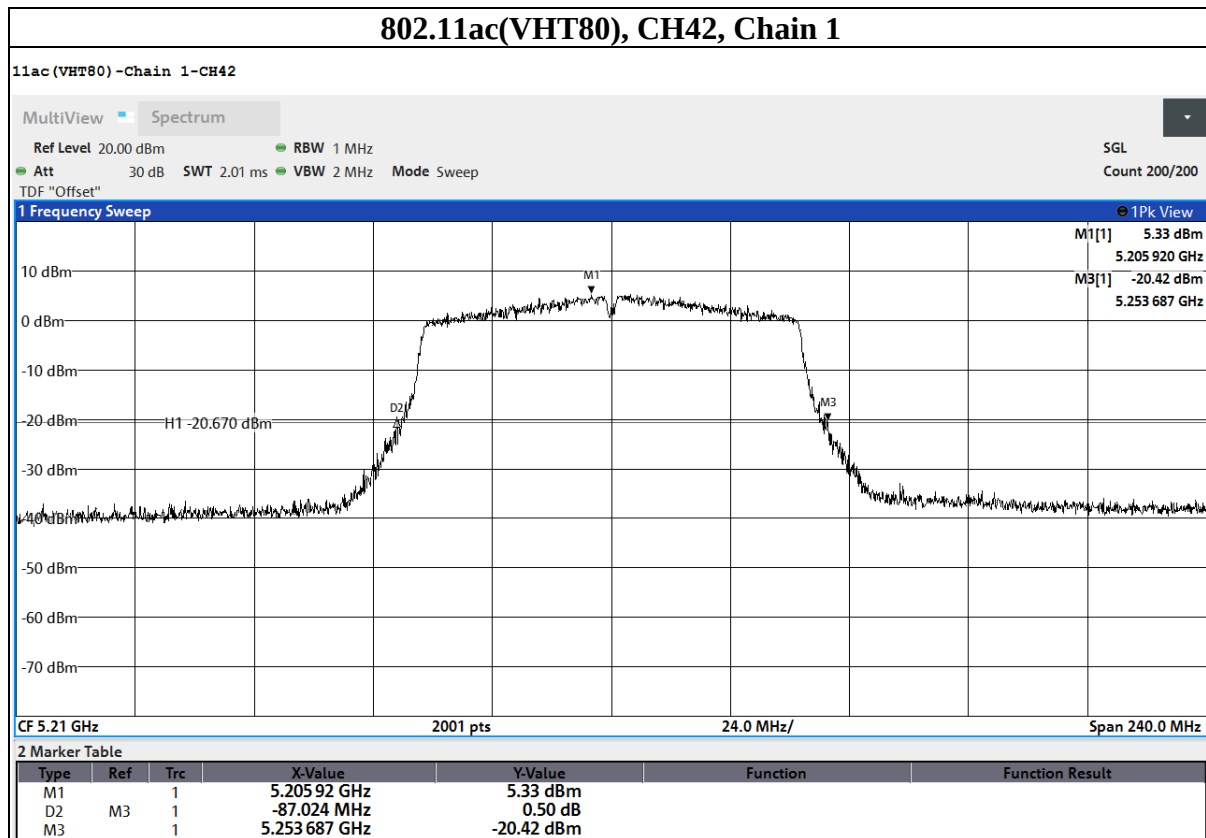
Mode	CH	Freq (MHz)	26dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT20)	36	5180	22.533	22.879	N/A	PASS
	44	5220	22.298	22.017	N/A	PASS
	48	5240	22.32	22.452	N/A	PASS
	52	5260	22.621	22.44	N/A	PASS
	60	5300	22.488	22.549	N/A	PASS
	64	5320	22.876	22.627	N/A	PASS
	100	5500	22.547	22.783	N/A	PASS
	116	5580	22.61	22.01	N/A	PASS
	140	5700	22.954	22.672	N/A	PASS
	144 (U-NII-2C)	5720	16.32	16.392	N/A	PASS
	144 (U-NII-2C+U-NII-3)	5720	22.575	22.497	N/A	PASS
	144 (U-NII-3)	5720	6.255	6.105	N/A	PASS



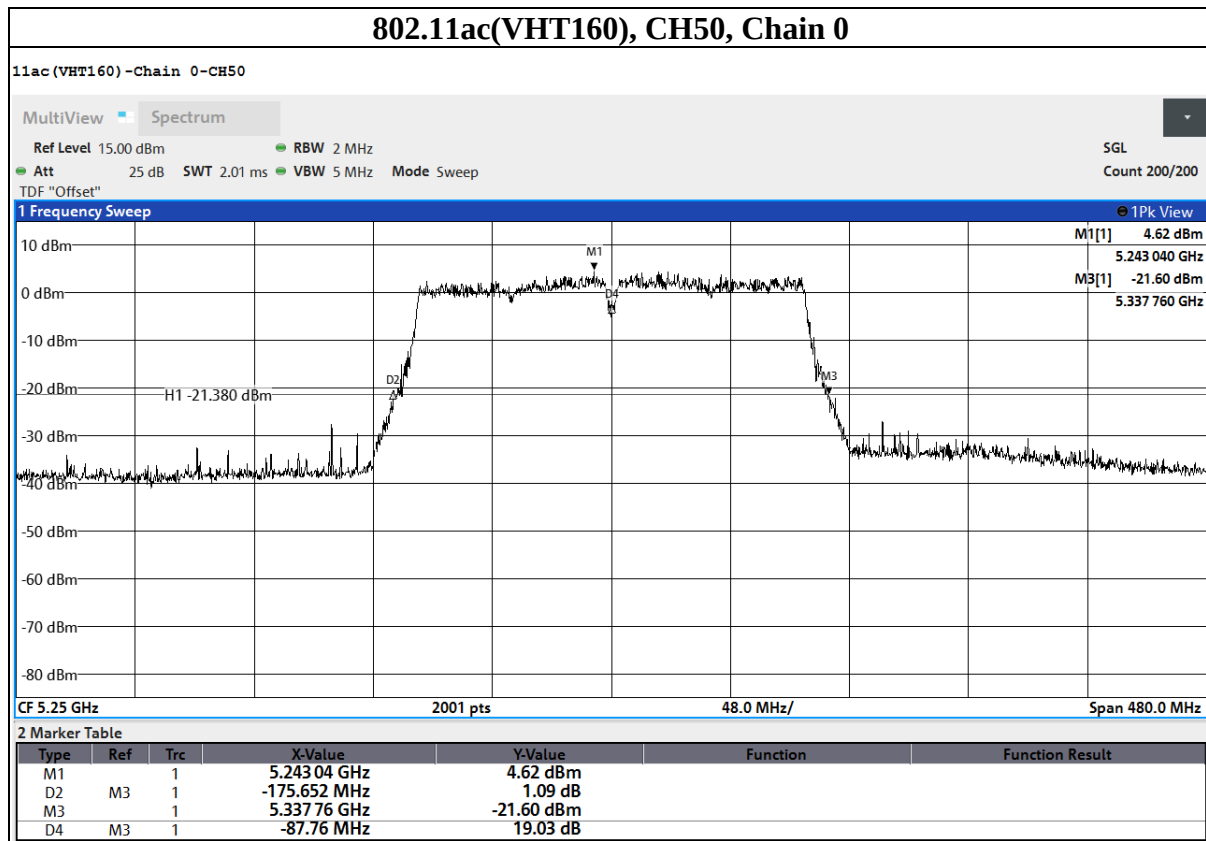
Mode	CH	Freq (MHz)	26dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT40)	38	5190	42.937	42.875	N/A	PASS
	46	5230	42.822	42.636	N/A	PASS
	54	5270	42.359	42.949	N/A	PASS
	62	5310	42.714	42.871	N/A	PASS
	102	5510	42.292	42.276	N/A	PASS
	110	5550	41.819	43.413	N/A	PASS
	134	5670	42.721	42.422	N/A	PASS
	142 (U-NII-2C)	5710	36.091	36.436	N/A	PASS
	142 (U-NII-2C+U-NII-3)	5710	42.515	42.381	N/A	PASS
	142 (U-NII-3)	5710	6.424	5.945	N/A	PASS



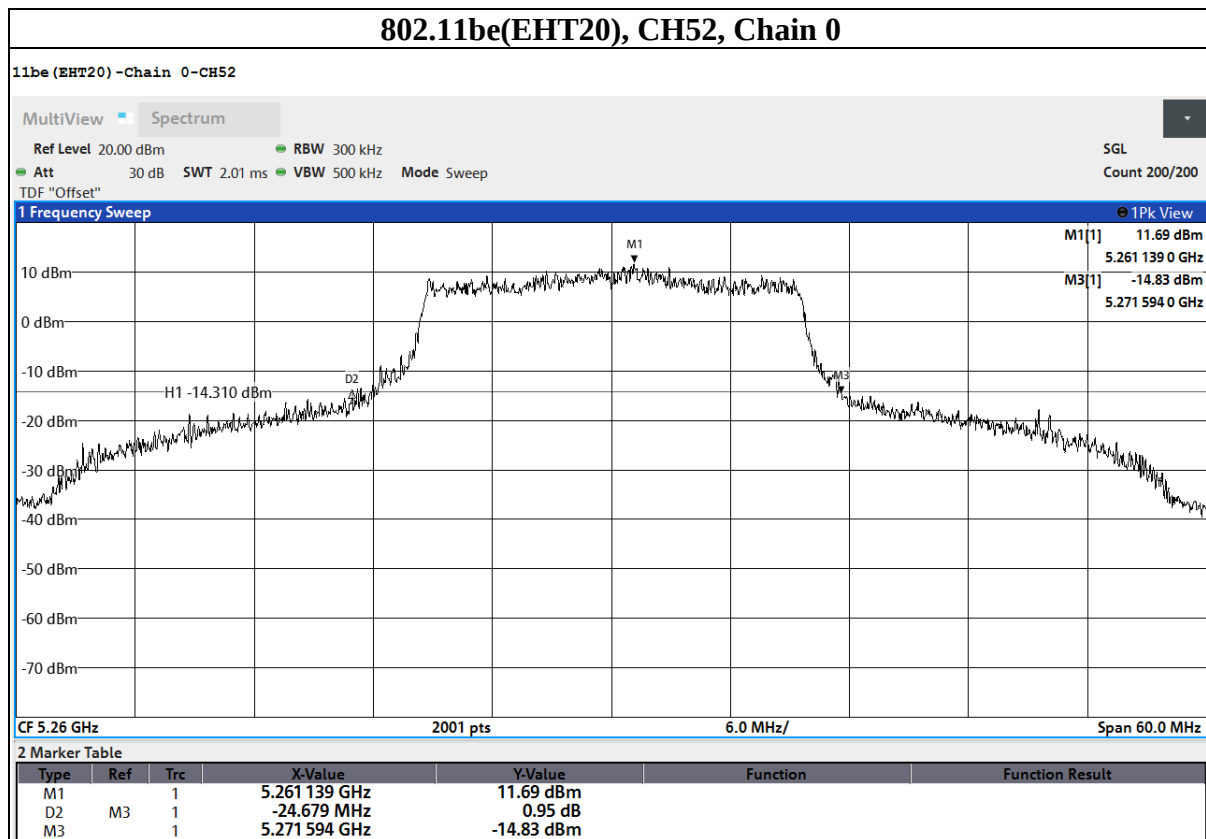
Mode	CH	Freq (MHz)	26dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT80)	42	5210	84.39	87.024	N/A	PASS
	58	5290	84.538	86.165	N/A	PASS
	106	5530	85.245	85.301	N/A	PASS
	122	5610	85.939	85.996	N/A	PASS
	138 (U-NII-2C)	5690	77.17	77.543	N/A	PASS
	138 (U-NII-2C+U-NII-3)	5690	84.799	85.434	N/A	PASS
	138 (U-NII-3)	5690	7.629	7.891	N/A	PASS



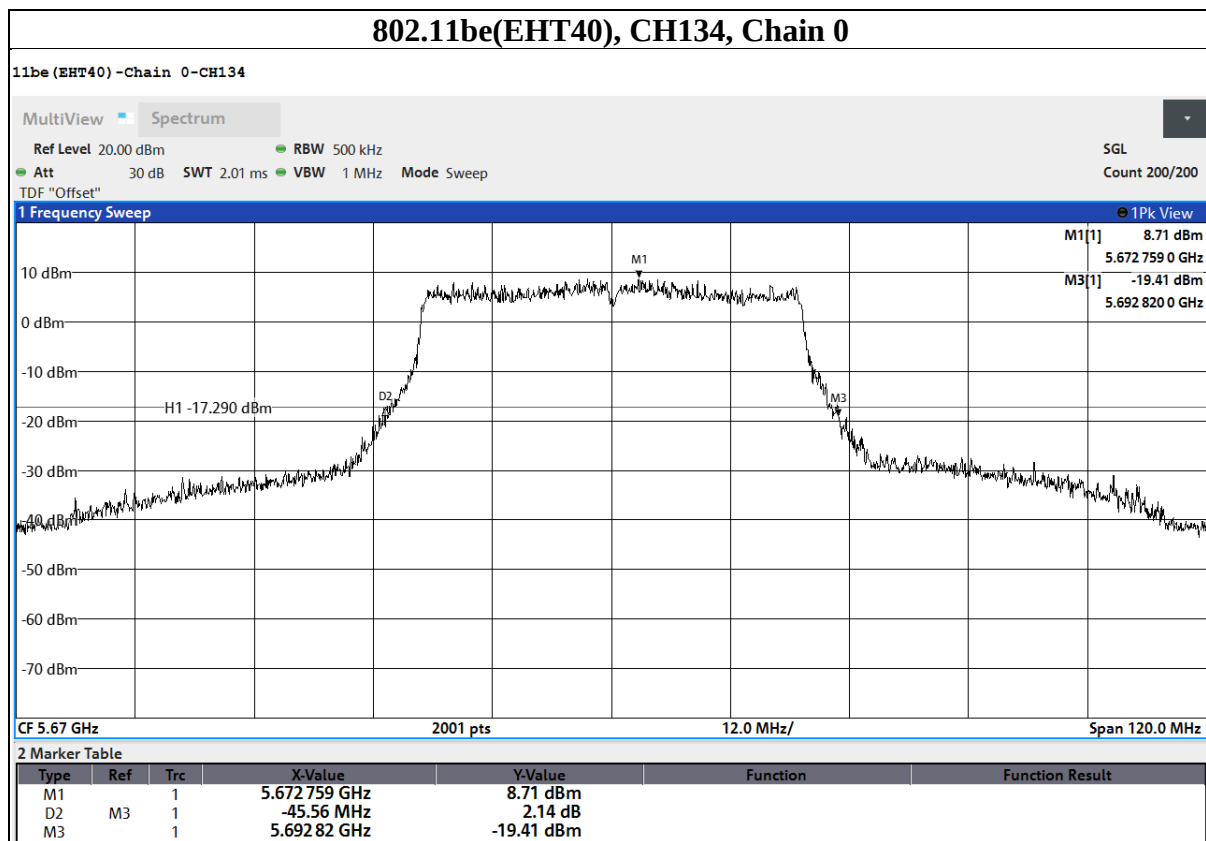
Mode	CH	Freq (MHz)	26dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT160)	50 (U-NII-1)	5250	87.892	86.426	N/A	PASS
	50 (U-NII-1+U-NII-2A)	5250	175.652	173.226	N/A	PASS
	50 (U-NII-2A)	5250	87.76	86.8	N/A	PASS
	114	5570	172.259	174.835	N/A	PASS



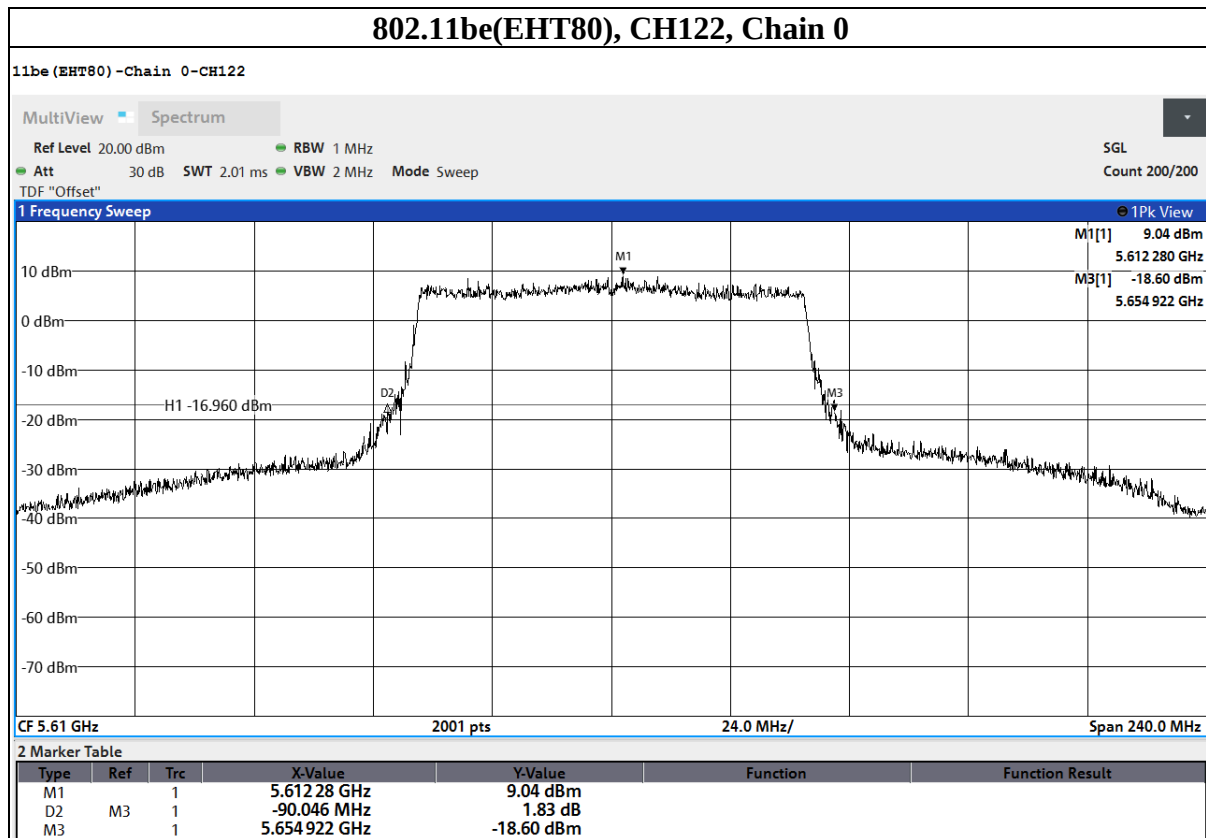
Mode	CH	Freq (MHz)	26dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11be(EHT20)	36	5180	23.769	23.126	N/A	PASS
	44	5220	22.513	22.263	N/A	PASS
	48	5240	24.016	22.437	N/A	PASS
	52	5260	24.679	23.332	N/A	PASS
	60	5300	23.791	22.73	N/A	PASS
	64	5320	23.467	22.676	N/A	PASS
	100	5500	22.91	23.056	N/A	PASS
	116	5580	23.144	22.457	N/A	PASS
	140	5700	22.921	21.922	N/A	PASS
	144 (U-NII-2C)	5720	16.819	17.483	N/A	PASS
	144 (U-NII-2C+U-NII-3)	5720	23.469	24.451	N/A	PASS
	144 (U-NII-3)	5720	6.65	6.968	N/A	PASS



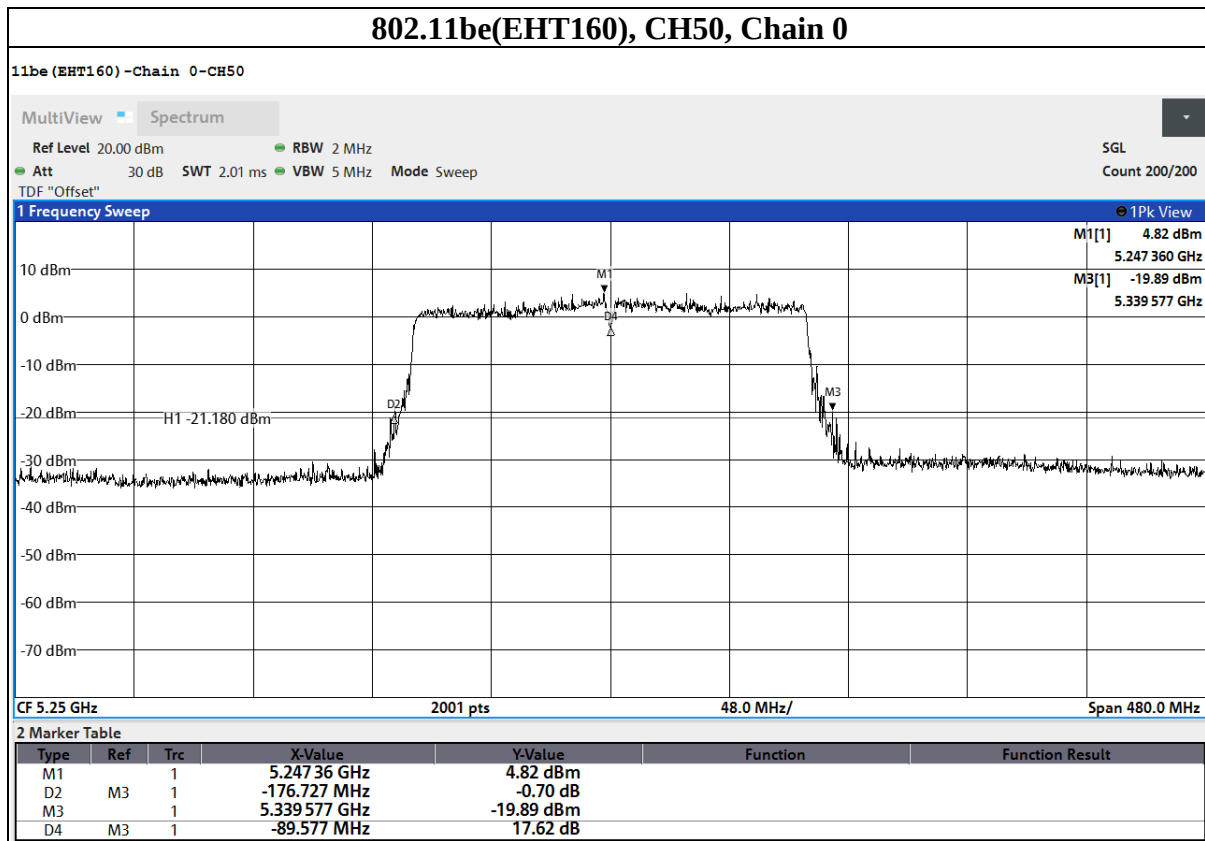
Mode	CH	Freq (MHz)	26dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11be(EHT40)	38	5190	43.98	44.768	N/A	PASS
	46	5230	45.045	44.815	N/A	PASS
	54	5270	44.475	44.637	N/A	PASS
	62	5310	43.66	44.746	N/A	PASS
	102	5510	44.427	44.299	N/A	PASS
	110	5550	44.842	44.805	N/A	PASS
	134	5670	45.56	44.443	N/A	PASS
	142 (U-NII-2C)	5710	37.276	37.353	N/A	PASS
	142 (U-NII-2C+U-NII-3)	5710	44.85	44.442	N/A	PASS
	142 (U-NII-3)	5710	7.574	7.089	N/A	PASS



Mode	CH	Freq (MHz)	26dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11be(EHT80)	42	5210	86.507	85.969	N/A	PASS
	58	5290	88.192	86.371	N/A	PASS
	106	5530	86.845	88.46	N/A	PASS
	122	5610	90.046	87.418	N/A	PASS
	138 (U-NII-2C)	5690	79.663	78.612	N/A	PASS
	138 (U-NII-2C+U-NII-3)	5690	88.338	87.306	N/A	PASS
	138 (U-NII-3)	5690	8.675	8.694	N/A	PASS



Mode	CH	Freq (MHz)	26dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11be(EHT160)	50 (U-NII-1)	5250	87.15	86.065	N/A	PASS
	50 (U-NII-1+U-NII-2A)	5250	176.727	172.488	N/A	PASS
	50 (U-NII-2A)	5250	89.577	86.423	N/A	PASS
	114	5570	175.38	171.219	N/A	PASS

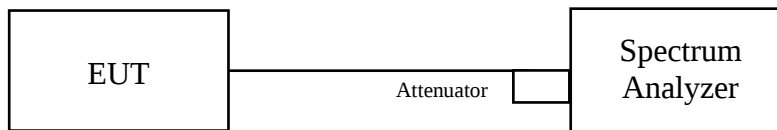


9.3. Occupied Bandwidth

Test procedure

- Set center frequency to the nominal EUT channel center frequency.
- Set span = 1.5 times to 5.0 times the OBW.
- Set RBW = 1% to 5% of the OBW
- Set VBW $\geq 3 \times$ RBW
- 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.
- Use the 99% power bandwidth function of the instrument (if available).
- 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.
- The plot of the test result only shows the worst case of channels as a representative.

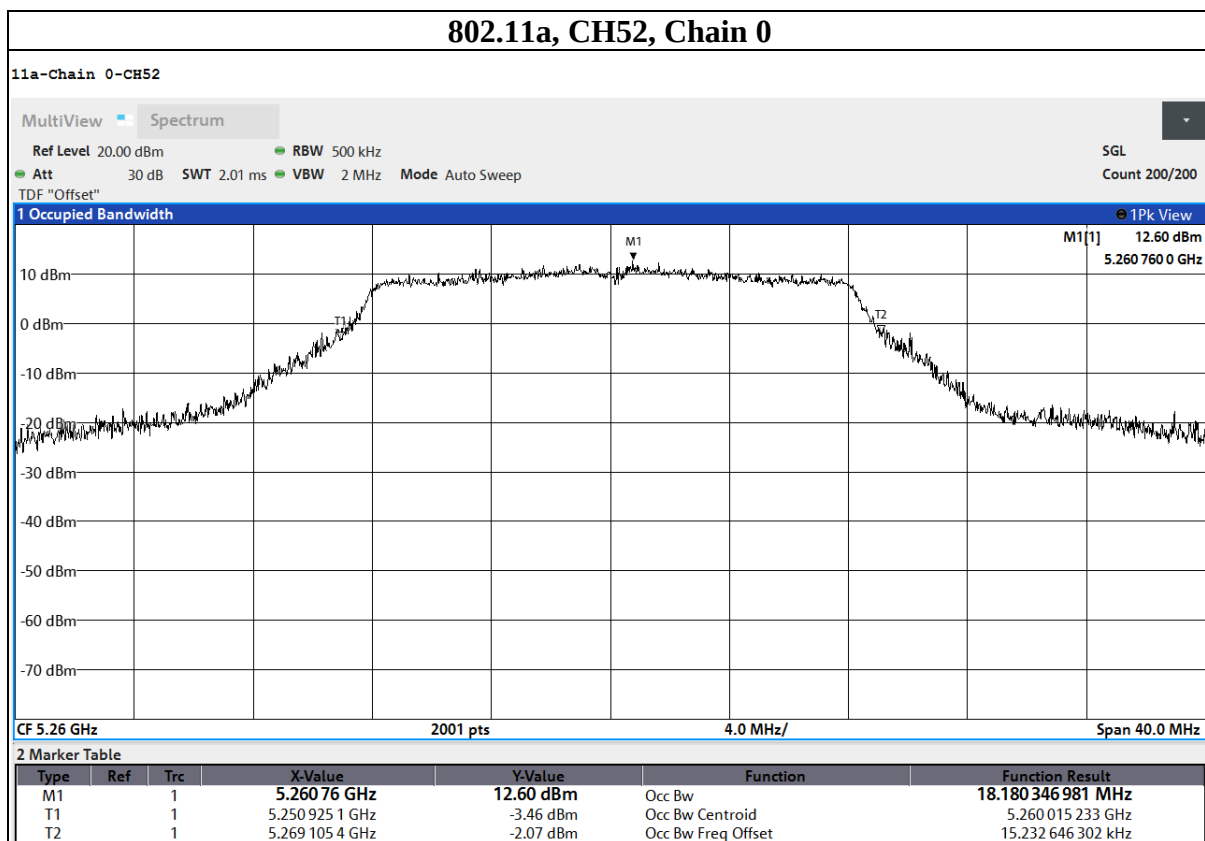
Test Setup



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	Chain 1		
802.11a	36	5180	17.978	17.325	N/A	PASS
	44	5220	17.553	17.253	N/A	PASS
	48	5240	18.16	17.223	N/A	PASS
	52	5260	18.18	17.255	N/A	PASS
	60	5300	18.095	17.246	N/A	PASS
	64	5320	17.931	17.235	N/A	PASS
	100	5500	17.819	17.208	N/A	PASS
	116	5580	17.864	17.59	N/A	PASS
	140	5700	17.276	17.367	N/A	PASS
	144 (U-NII-2C)	5720	13.822	13.653	N/A	PASS
	144 (U-NII-2C+U-NII-3)	5720	17.766	17.582	N/A	PASS
	144 (U-NII-3)	5720	3.944	3.929	N/A	PASS
	149	5745	17.867	17.607	N/A	PASS
	157	5785	17.839	17.601	N/A	PASS
	165	5825	17.944	17.456	N/A	PASS



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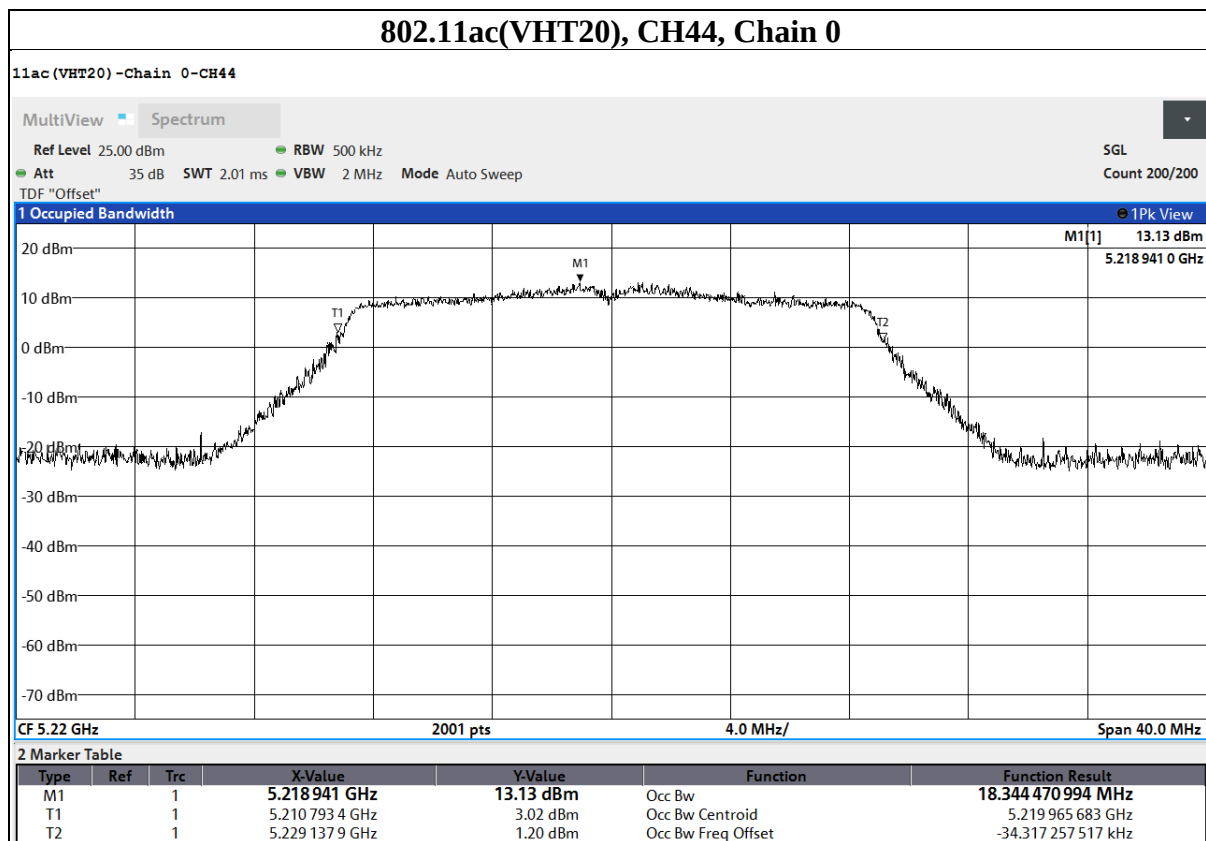
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Doc No: Form-ULID-004739 (DCS:17-EM-F0878) / 6.1

Mode	CH	Freq (MHz)	OBW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT20)	36	5180	18.218	18.234	N/A	PASS
	44	5220	18.344	18.242	N/A	PASS
	48	5240	18.25	18.213	N/A	PASS
	52	5260	18.155	18.245	N/A	PASS
	60	5300	18.169	18.159	N/A	PASS
	64	5320	18.19	18.233	N/A	PASS
	100	5500	18.204	18.256	N/A	PASS
	116	5580	18.215	18.277	N/A	PASS
	140	5700	18.176	18.241	N/A	PASS
	144 (U-NII-2C)	5720	14.148	14.176	N/A	PASS
	144 (U-NII-2C+U-NII-3)	5720	18.175	18.257	N/A	PASS
	144 (U-NII-3)	5720	4.026	4.081	N/A	PASS
	149	5745	18.201	18.268	N/A	PASS
	157	5785	18.23	18.222	N/A	PASS
	165	5825	18.211	18.268	N/A	PASS



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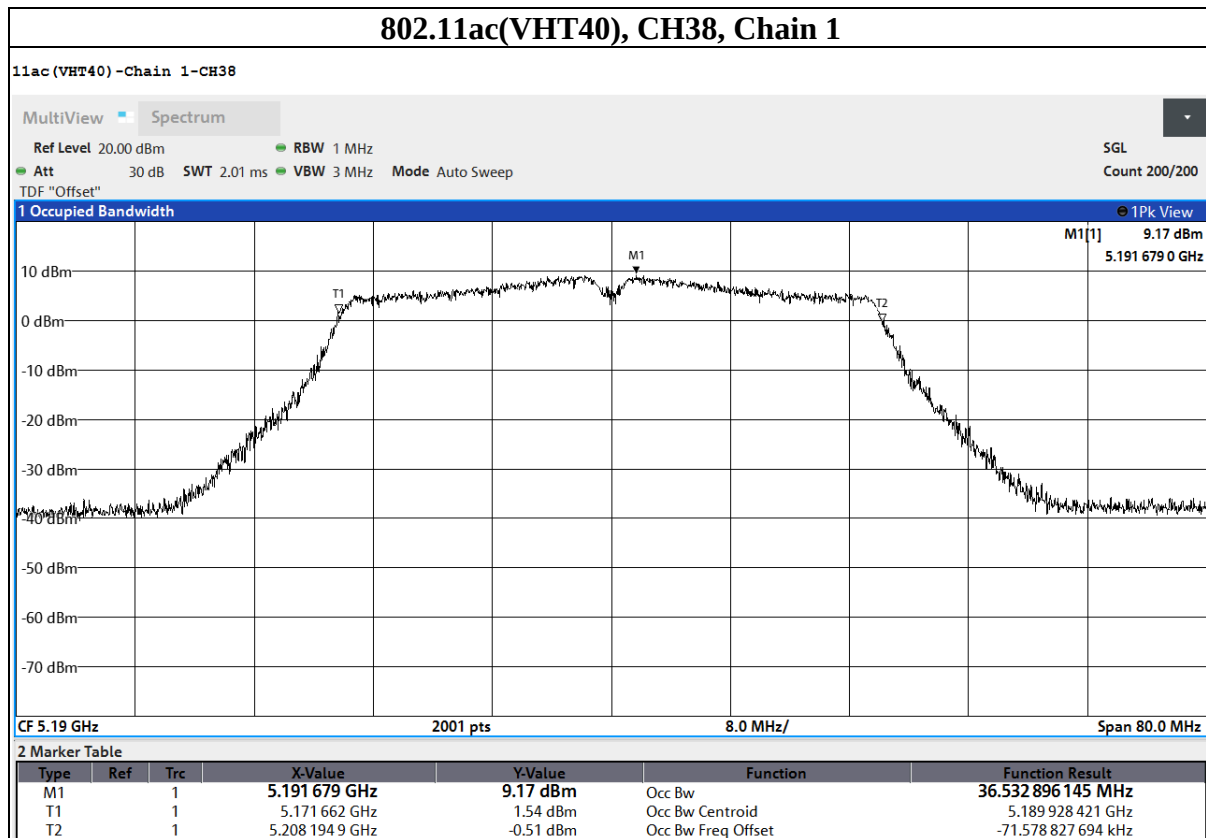
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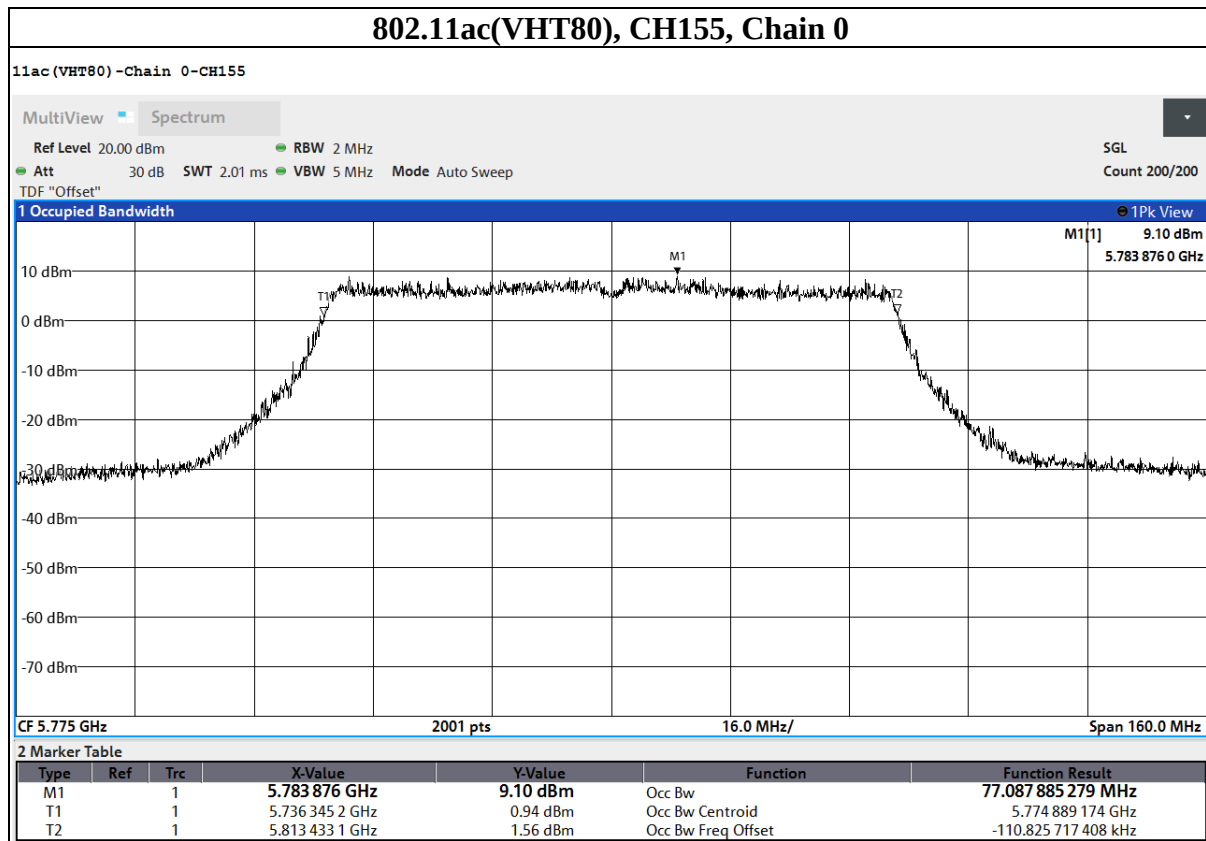
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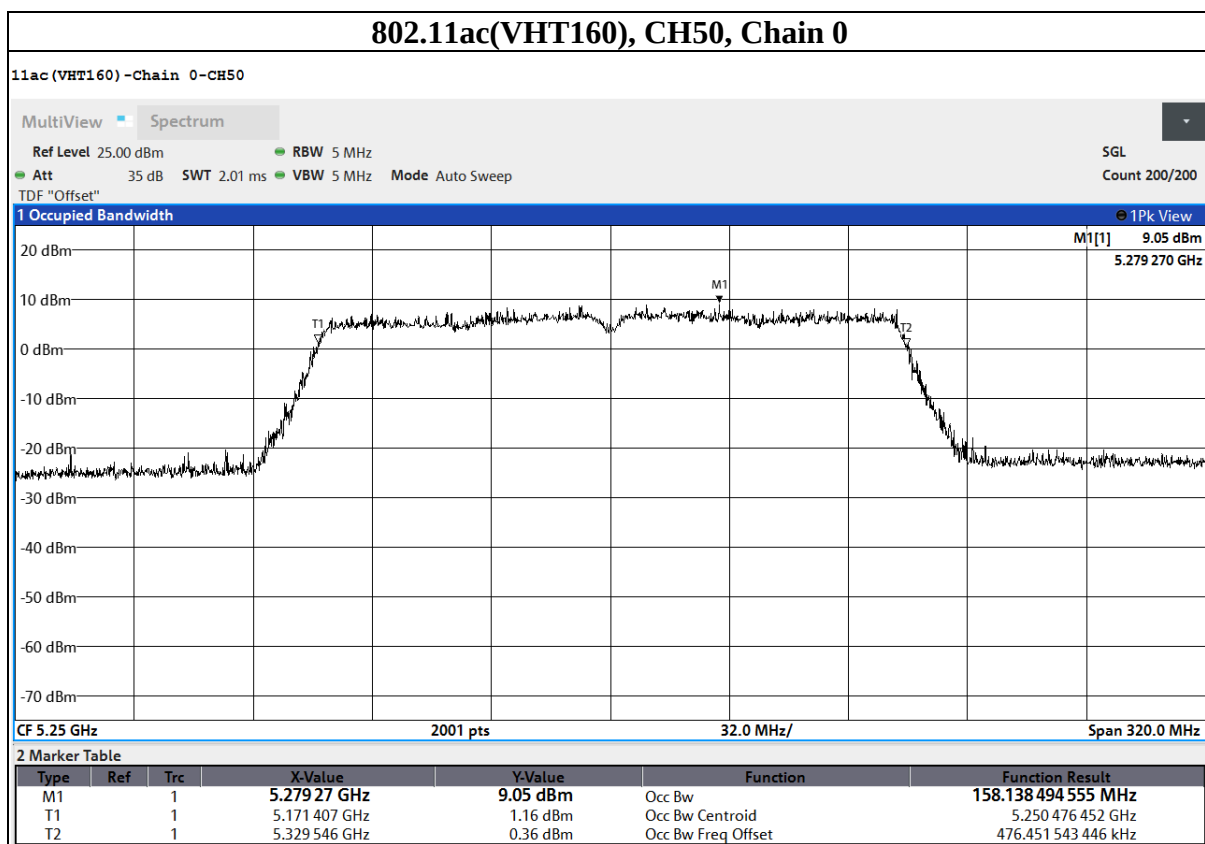
Mode	CH	Freq (MHz)	OBW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT40)	38	5190	36.423	36.533	N/A	PASS
	46	5230	36.428	36.471	N/A	PASS
	54	5270	36.369	36.456	N/A	PASS
	62	5310	36.422	36.509	N/A	PASS
	102	5510	36.481	36.449	N/A	PASS
	110	5550	36.471	36.422	N/A	PASS
	134	5670	36.483	36.485	N/A	PASS
	142 (U-NII-2C)	5710	33.317	33.297	N/A	PASS
	142 (U-NII-2C+U-NII-3)	5710	36.507	36.432	N/A	PASS
	142 (U-NII-3)	5710	3.19	3.135	N/A	PASS
	151	5755	36.449	36.478	N/A	PASS
	159	5795	36.442	36.485	N/A	PASS



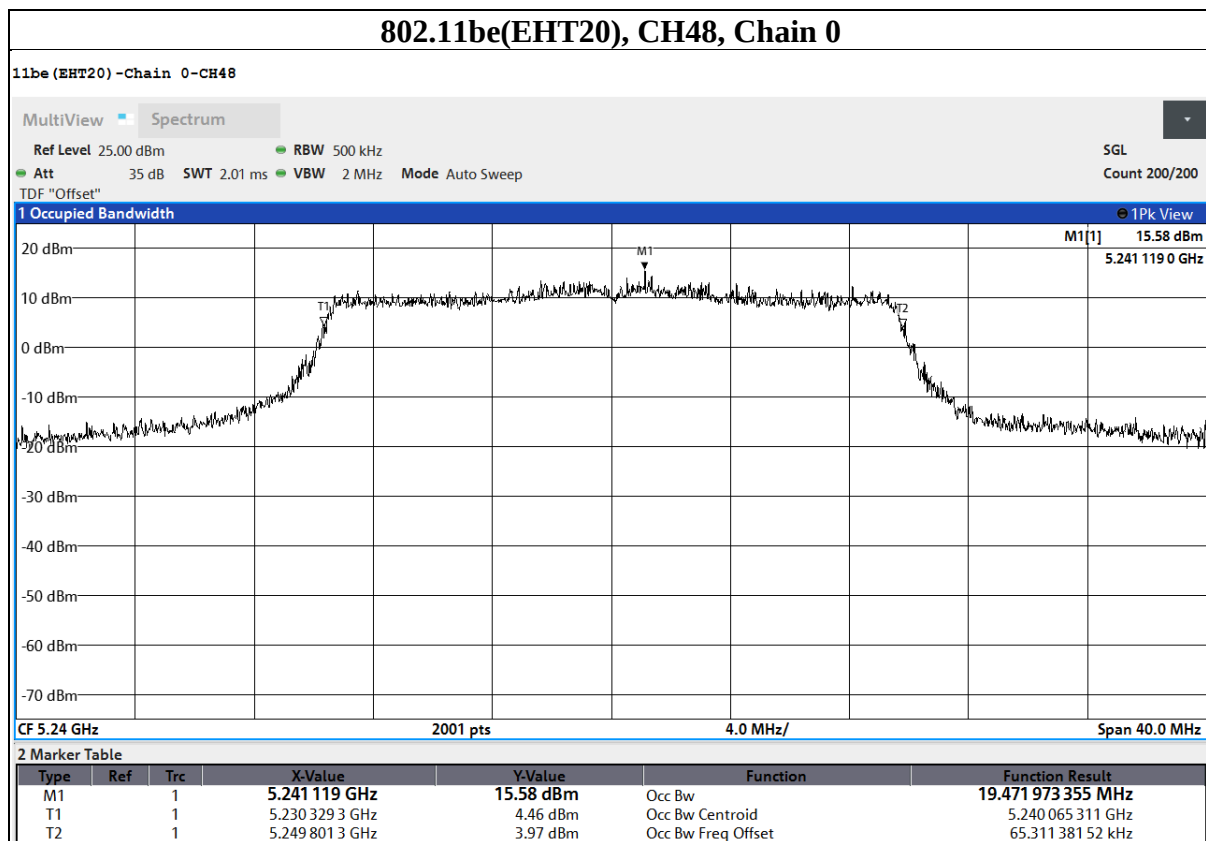
Mode	CH	Freq (MHz)	OBW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT80)	42	5210	75.652	75.681	N/A	PASS
	58	5290	75.659	75.724	N/A	PASS
	106	5530	75.724	75.722	N/A	PASS
	122	5610	75.728	75.747	N/A	PASS
	138 (U-NII-2C)	5690	72.74	72.842	N/A	PASS
	138 (U-NII-2C+U-NII-3)	5690	75.554	75.744	N/A	PASS
	138 (U-NII-3)	5690	2.814	2.902	N/A	PASS
	155	5775	77.088	75.742	N/A	PASS



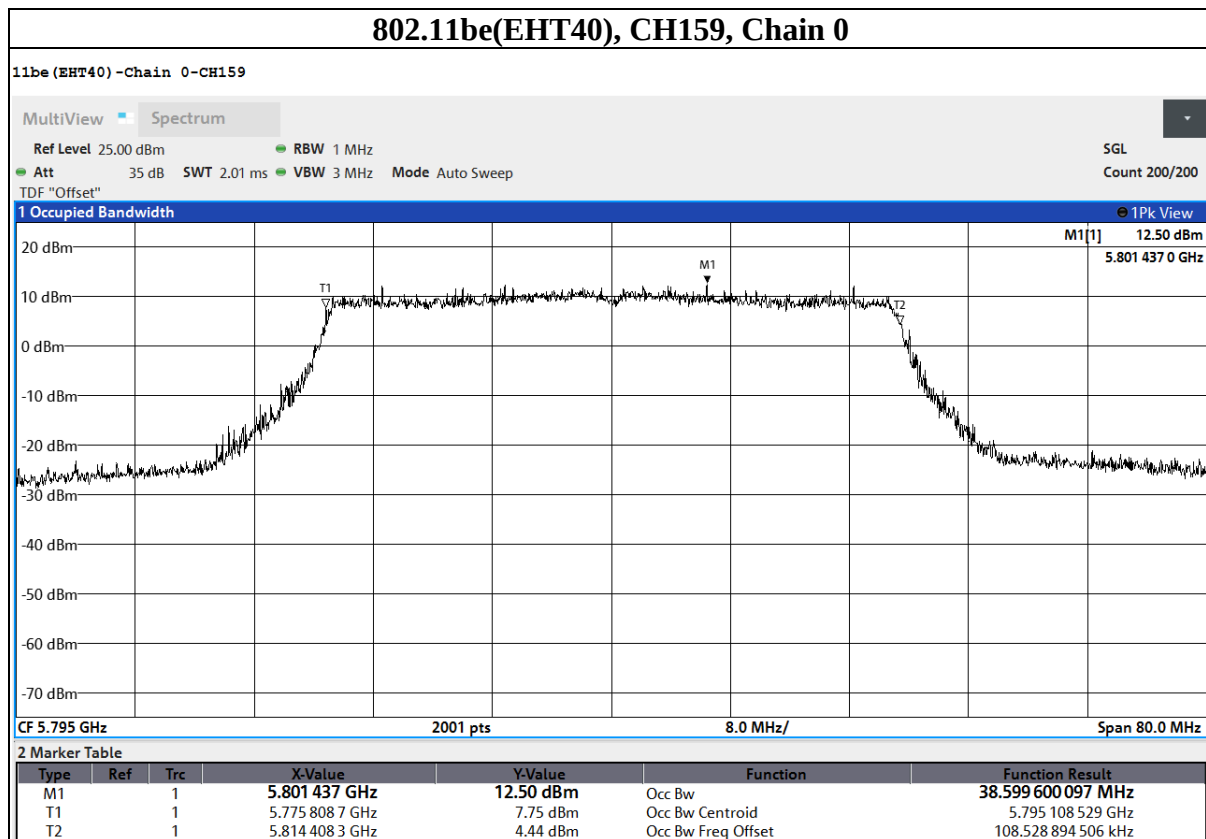
Mode	CH	Freq (MHz)	OBW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT160)	50 (U-NII-1)	5250	78.593	78.551	N/A	PASS
	50 (U-NII-1+U-NII-2A)	5250	158.138	157.552	N/A	PASS
	50 (U-NII-2A)	5250	79.546	79.001	N/A	PASS
	114	5570	157.379	157.27	N/A	PASS



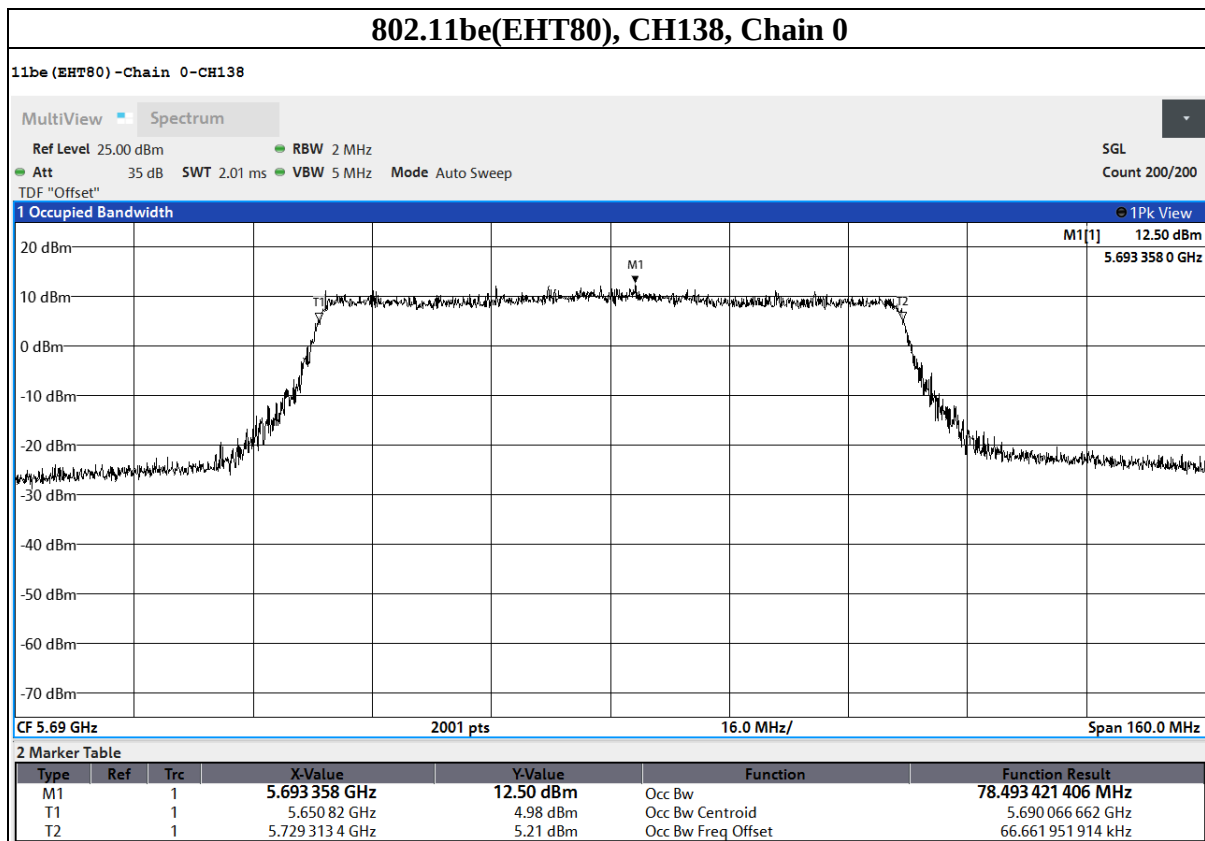
Mode	CH	Freq (MHz)	OBW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11be(EHT20)	36	5180	19.326	19.276	N/A	PASS
	44	5220	19.136	19.138	N/A	PASS
	48	5240	19.472	19.237	N/A	PASS
	52	5260	19.384	19.263	N/A	PASS
	60	5300	19.416	19.287	N/A	PASS
	64	5320	19.326	19.235	N/A	PASS
	100	5500	19.283	19.252	N/A	PASS
	116	5580	19.271	19.241	N/A	PASS
	140	5700	19.259	19.169	N/A	PASS
	144 (U-NII-2C)	5720	14.535	14.529	N/A	PASS
	144 (U-NII-2C+U-NII-3)	5720	19.242	19.244	N/A	PASS
	144 (U-NII-3)	5720	4.706	4.714	N/A	PASS
	149	5745	19.381	19.254	N/A	PASS
	157	5785	19.298	19.295	N/A	PASS
	165	5825	19.343	19.274	N/A	PASS



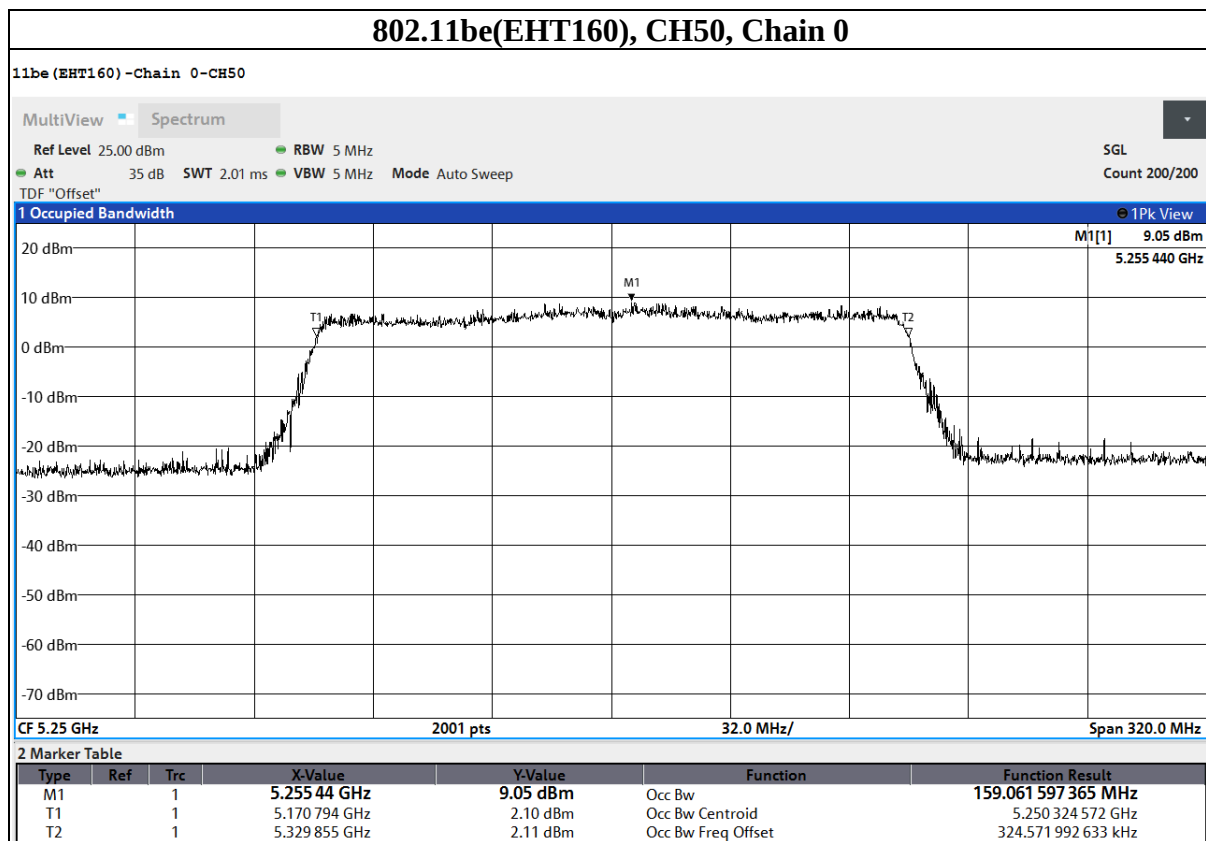
Mode	CH	Freq (MHz)	OBW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11be(EHT40)	38	5190	38.516	38.44	N/A	PASS
	46	5230	38.519	38.469	N/A	PASS
	54	5270	38.503	38.479	N/A	PASS
	62	5310	38.45	38.449	N/A	PASS
	102	5510	38.476	38.425	N/A	PASS
	110	5550	38.467	38.523	N/A	PASS
	134	5670	38.508	38.533	N/A	PASS
	142 (U-NII-2C)	5710	34.128	34.122	N/A	PASS
	142 (U-NII-2C+U-NII-3)	5710	38.426	38.457	N/A	PASS
	142 (U-NII-3)	5710	4.298	4.334	N/A	PASS
	151	5755	38.458	38.432	N/A	PASS
	159	5795	38.6	38.504	N/A	PASS



Mode	CH	Freq (MHz)	OBW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11be(EHT80)	42	5210	78.28	78.196	N/A	PASS
	58	5290	78.399	78.166	N/A	PASS
	106	5530	78.388	78.392	N/A	PASS
	122	5610	78.336	78.236	N/A	PASS
	138 (U-NII-2C)	5690	74.18	74.136	N/A	PASS
	138 (U-NII-2C+U-NII-3)	5690	78.493	78.289	N/A	PASS
	138 (U-NII-3)	5690	4.313	4.154	N/A	PASS
	155	5775	78.421	78.142	N/A	PASS



Mode	CH	Freq (MHz)	OBW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11be(EHT160)	50 (U-NII-1)	5250	79.206	79.286	N/A	PASS
	50 (U-NII-1+U-NII-2A)	5250	159.062	158.937	N/A	PASS
	50 (U-NII-2A)	5250	79.855	79.651	N/A	PASS
	114	5570	158.938	158.586	N/A	PASS



9.4. Conducted output power

Requirements

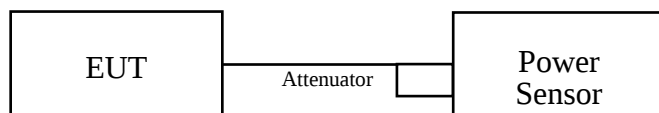
Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	1 Watt (30 dBm) Max. e.i.r.p $\leq 125\text{mW}$ (21 dBm) at any elevation angle above 30 degrees as measured from the horizon If $G_{\text{TX}} > 6 \text{ dBi}$, then $P_{\text{Out}} = 30 - (G_{\text{TX}} - 6)$
		Fixed point-to-point Access Point	1 Watt (30 dBm) If $G_{\text{TX}} > 23 \text{ dBi}$, then $P_{\text{Out}} = 30 - (G_{\text{TX}} - 23)$
		Indoor Access Point	1 Watt (30 dBm) If $G_{\text{TX}} > 6 \text{ dBi}$, then $P_{\text{Out}} = 30 - (G_{\text{TX}} - 6)$
	√	Client device	250mW (24 dBm) If $G_{\text{TX}} > 6 \text{ dBi}$, then $P_{\text{Out}} = 23.98 - (G_{\text{TX}} - 6)$
U-NII-2A	√		250mW (24 dBm) or 11 dBm+10 log B* If $G_{\text{TX}} > 6 \text{ dBi}$, then $P_{\text{Out}} = 23.98 - (G_{\text{TX}} - 6)$
U-NII-2C	√		250mW (24 dBm) or 11 dBm+10 log B* If $G_{\text{TX}} > 6 \text{ dBi}$, then $P_{\text{Out}} = 23.98 - (G_{\text{TX}} - 6)$
U-NII-3	√		For Point-to-multipoint systems (P2M): 1 Watt (30 dBm). If $G_{\text{TX}} > 6 \text{ dBi}$, then $P_{\text{Out}} = 30 - (G_{\text{TX}} - 6)$ For Point-to-point systems (P2P): 1 Watt (30 dBm)
U-NII-4		Indoor Access Point	Maximum e.i.r.p. 4 W
		Subordinate Device	Maximum e.i.r.p. 4 W
		Client Device	Maximum e.i.r.p. 1 W

Note:

1. P_{Out} = maximum conducted output power in dBm, G_{TX} = the maximum transmitting antenna directional gain in dBi, B is the 26 dB emission bandwidth in megahertz
2. If EUT with Multiple Transmitter Output:
 - a. Directional Gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{Gn/20})^2 / N_{\text{ant}}]$ dBi.
Nant: Number of Transmit Antennas
G1, G2,..., Gn: Gain of Individual Antennas
Example: two antenna and gain 5 dBi / 3dBi, so if it was used for TxBF power measurement
Directional Gain = $10 \log[(105/20 + 103/20)^2 / 2]$ dBi = 7.07 dBi
 - b. Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices, CDD
Array Gain = 0 dB (i.e., no array gain) for $N_{\text{ANT}} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT} ;
Array Gain = $5 \log(N_{\text{ANT}}/N_{\text{SS}})$ dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{\text{ANT}} \geq 5$.
Example: Maximum antenna gain = 5 dBi and $N_{\text{ANT}} \leq 4$, so if it was used for CDD power measurement
Directional Gain = 5 dBi + Array Gain = 5 dBi + 0 dB = 5 dBi
 - c. For power measurement of KDB 662911 is used with multiple transmitter output. Total conducted power is the sum of the conducted power levels measured at the various output ports.
3. Straddle Channel Power in each band = Straddle Channel Total Power * (Each band EBW / Straddle Channel Total EBW).
Example: if CH144 EBW (Total) = 20MHz, within UNII-2C Band is 15MHz, within UNII-3 Band is 5MHz,
Total Power = 20dBm.
Calculation for UNII-2C Band Power= 20dBm * (5/20) = 13.97 dBm
Calculation for UNII-3 Band Power= 20dBm * (15/20) = 18.75 dBm.

Test Procedure**For Average Power Measurement****Test method PM**

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst and set the detector to AVERAGE. Duty factor is not added to measured value.

Test Setup**For Average Power Measurement**

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

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Test Data

802.11a

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
36	5180	18.28	17.31	121.06	20.83	23.98	PASS
44	5220	18.47	17.72	129.42	21.12	23.98	PASS
48	5240	18.46	17.70	129.122	21.11	23.98	PASS
52	5260	18.01	17.35	117.49	20.70	23.98	PASS
60	5300	18.27	17.46	122.744	20.89	23.98	PASS
64	5320	17.72	16.91	108.143	20.34	23.98	PASS
100	5500	17.18	16.56	97.499	19.89	23.98	PASS
116	5580	17.81	17.16	112.46	20.51	23.98	PASS
140	5700	17.46	16.91	104.713	20.20	23.98	PASS
144*	5720	16.91	16.39	92.683	19.67	23.98	-
144 (U-NII-2c Band)	5720	15.45	14.93	66.222	18.21	23.12	PASS
144 (U-NII-3 Band)	5720	11.46	10.96	26.485	14.23	30	PASS
149	5745	17.52	17.16	108.393	20.35	30	PASS
157	5785	17.52	17.11	107.895	20.33	30	PASS
165	5825	17.88	17.36	115.878	20.64	30	PASS

Note:

1. The directional gain = 3.68 dBi < 6 dBi, so the power limit shall not be reduced.
2. Record the total power CH144* value for reference only.

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802.11ac (VHT20)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
36	5180	16.79	15.82	85.901	19.34	23.98	PASS
44	5220	18.52	17.67	129.718	21.13	23.98	PASS
48	5240	18.52	17.62	128.825	21.10	23.98	PASS
52	5260	18.49	17.66	129.122	21.11	23.98	PASS
60	5300	18.43	17.60	127.35	21.05	23.98	PASS
64	5320	17.01	16.21	92.045	19.64	23.98	PASS
100	5500	16.65	15.97	85.704	19.33	23.98	PASS
116	5580	16.79	16.44	91.833	19.63	23.98	PASS
140	5700	14.41	14.02	52.845	17.23	23.98	PASS
144*	5720	16.40	16.06	83.946	19.24	23.98	-
144 (U-NII-2c Band)	5720	14.99	14.69	60.954	17.85	23.12	PASS
144 (U-NII-3 Band)	5720	10.83	10.40	23.067	13.63	30	PASS
149	5745	17.76	17.23	112.46	20.51	30	PASS
157	5785	17.57	17.22	109.901	20.41	30	PASS
165	5825	17.71	17.45	114.551	20.59	30	PASS

Note:

1. The directional gain = 3.68 dBi < 6 dBi, so the power limit shall not be reduced.
2. Record the total power CH144* value for reference only.

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802.11ac (VHT40)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
38	5190	16.57	15.47	80.724	19.07	23.98	PASS
46	5230	18.49	17.76	130.317	21.15	23.98	PASS
54	5270	18.76	17.93	137.404	21.38	23.98	PASS
62	5310	16.34	15.37	77.446	18.89	23.98	PASS
102	5510	16.03	15.34	74.302	18.71	23.98	PASS
110	5550	18.96	18.23	145.211	21.62	23.98	PASS
134	5670	17.74	17.37	114.025	20.57	23.98	PASS
142*	5710	17.62	17.46	113.501	20.55	23.98	-
142 (U-NII-2c Band)	5710	16.91	16.80	97.051	19.87	23.98	PASS
142 (U-NII-3 Band)	5710	9.41	8.93	16.558	12.19	30	PASS
151	5755	17.47	17.06	106.66	20.28	30	PASS
159	5795	17.39	17.03	105.196	20.22	30	PASS

Note:

1. The directional gain = 3.68 dBi < 6 dBi, so the power limit shall not be reduced.
2. Record the total power CH142* value for reference only.

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

802.11ac (VHT80)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
42	5210	15.32	14.48	62.087	17.93	23.98	PASS
58	5290	14.69	13.92	54.075	17.33	23.98	PASS
106	5530	15.11	14.34	59.566	17.75	23.98	PASS
122	5610	17.25	16.62	99.083	19.96	23.98	PASS
138*	5690	16.92	16.45	93.325	19.70	23.98	-
138 (U-NII-2c Band)	5690	16.51	16.03	84.918	19.29	23.98	PASS
138 (U-NII-3 Band)	5690	6.46	6.11	8.511	9.30	30	PASS
155	5775	16.45	16.12	85.114	19.30	30	PASS

Note:

1. The directional gain = 3.68 dBi < 6 dBi, so the power limit shall not be reduced.
2. Record the total power CH138* value for reference only.

802.11ac (VHT160)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
50	5250	13.09	12.16	36.813	15.66	23.98	PASS
50 (U-NII-1 Band)	5250	10.08	9.14	18.408	12.65	23.98	PASS
50 (U-NII-2a Band)	5250	10.08	9.16	18.408	12.65	23.98	PASS
114	5570	12.60	12.11	34.435	15.37	23.98	PASS

Note:

1. The directional gain = 3.68 dBi < 6 dBi, so the power limit shall not be reduced.
2. Record the total power CH138* value for reference only.

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802.11be (EHT20)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
36	5180	17.42	16.43	99.083	19.96	23.98	PASS
44	5220	19.12	18.55	153.109	21.85	23.98	PASS
48	5240	19.12	18.28	148.936	21.73	23.98	PASS
52	5260	18.92	18.42	147.571	21.69	23.98	PASS
60	5300	18.91	17.92	139.637	21.45	23.98	PASS
64	5320	17.77	16.85	108.143	20.34	23.98	PASS
100	5500	17.27	16.73	100.462	20.02	23.98	PASS
116	5580	18.03	17.41	118.577	20.74	23.98	PASS
140	5700	15.16	14.71	62.373	17.95	23.98	PASS
144*	5720	17.22	16.57	98.175	19.92	23.98	-
144 (U-NII-2c Band)	5720	15.77	15.11	70.146	18.46	23.25	PASS
144 (U-NII-3 Band)	5720	11.74	11.12	27.861	14.45	30	PASS
149	5745	18.41	17.95	131.826	21.20	30	PASS
157	5785	18.12	17.70	123.88	20.93	30	PASS
165	5825	18.42	17.93	131.522	21.19	30	PASS

Note:

1. The directional gain = 3.68 dBi < 6 dBi, so the power limit shall not be reduced.
2. Record the total power CH144* value for reference only.

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802.11be (EHT40)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
38	5190	16.55	15.61	81.658	19.12	23.98	PASS
46	5230	18.52	17.77	130.918	21.17	23.98	PASS
54	5270	18.85	17.92	138.676	21.42	23.98	PASS
62	5310	16.28	15.32	76.56	18.84	23.98	PASS
102	5510	16.04	15.36	74.473	18.72	23.98	PASS
110	5550	18.68	18.21	139.959	21.46	23.98	PASS
134	5670	17.80	17.27	113.501	20.55	23.98	PASS
142*	5710	17.65	17.25	111.173	20.46	23.98	-
142 (U-NII-2c Band)	5710	16.85	16.50	93.111	19.69	23.98	PASS
142 (U-NII-3 Band)	5710	9.93	9.28	18.323	12.63	30	PASS
151	5755	17.45	17.10	106.905	20.29	30	PASS
159	5795	17.30	17.08	104.713	20.20	30	PASS

Note:

1. The directional gain = 3.68 dBi < 6 dBi, so the power limit shall not be reduced.
2. Record the total power CH142* value for reference only.

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802.11be (EHT80)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
42	5210	15.31	14.54	62.373	17.95	23.98	PASS
58	5290	14.78	13.82	54.2	17.34	23.98	PASS
106	5530	15.26	14.47	61.518	17.89	23.98	PASS
122	5610	17.31	16.93	103.039	20.13	23.98	PASS
138*	5690	16.87	16.53	93.541	19.71	23.98	-
138 (U-NII-2c Band)	5690	16.42	16.07	84.333	19.26	23.98	PASS
138 (U-NII-3 Band)	5690	6.79	6.51	9.247	9.66	30	PASS
155	5775	16.52	16.19	86.497	19.37	30	PASS

Note:

1. The directional gain = 3.68 dBi < 6 dBi, so the power limit shall not be reduced.
2. Record the total power CH138* value for reference only.

802.11be (EHT160)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
50	5250	13.17	12.27	37.584	15.75	23.98	PASS
50 (U-NII-1 Band)	5250	10.10	9.25	18.664	12.71	23.98	PASS
50 (U-NII-2a Band)	5250	10.22	9.27	18.967	12.78	23.98	PASS
114	5570	12.77	12.19	35.481	15.50	23.98	PASS

Note:

1. The directional gain = 3.68 dBi < 6 dBi, so the power limit shall not be reduced.
2. Record the total power CH138* value for reference only.

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9.5. Power Spectral Density

Requirements

Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	17dBm/ MHz If $G_{TX} > 6$ dBi, then $PSD = 17 - (G_{TX} - 6)$
		Fixed point-to-point Access Point	17dBm/ MHz If $G_{TX} > 23$ dBi, then $PSD = 17 - (G_{TX} - 23)$
		Indoor Access Point	17dBm/ MHz If $G_{TX} > 6$ dBi, then $PSD = 17 - (G_{TX} - 6)$
	√	Client device	11dBm/ MHz If $G_{TX} > 6$ dBi, then $PSD = 11 - (G_{TX} - 6)$
U-NII-2A	√		11dBm/ MHz If $G_{TX} > 6$ dBi, then $PSD = 11 - (G_{TX} - 6)$
U-NII-2C	√		11dBm/ MHz If $G_{TX} > 6$ dBi, then $PSD = 11 - (G_{TX} - 6)$
U-NII-3	√		For Point-to-multipoint systems (P2M): 30dBm/ 500kHz. If $G_{TX} > 6$ dBi, then $PSD = 30 - (G_{TX} - 6)$ For Point-to-point systems (P2P): 30dBm/ 500kHz
U-NII-4		Indoor Access Point	Maximum e.i.r.p. PSD 20 dBm/MHz
		Subordinate Device	Maximum e.i.r.p. PSD 20 dBm/MHz
		Client Device	Maximum e.i.r.p. PSD 14 dBm/MHz

Note:

1. PSD = power spectral density that the same method as used to determine the conducted output power shall be used to determine the power spectral density. And power spectral density in dBm/MHz
2. G_{TX} = the maximum transmitting antenna directional gain in dBi.
3. If EUT with Multiple Transmitter Output:
 - a. Directional Gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{Gn/20})^2 / Nant]$ dBi.
Nant: Number of Transmit Antennas
G1, G2,..., Gn: Gain of Individual Antennas
Example: two antenna and gain 5 dBi / 3dBi, so if it was used for power density measurement
Directional Gain = $10 \log[(10^{5/20} + 10^{3/20})^2 / 2]$ dBi = 7.07 dBi
 - b. "PSD per chain" of the report shown is maximum value for each chain, at the "Total PSD" is summing entire spectra across corresponding frequency bins on the various outputs by computer, refer KDB 662911 Method a) for calculating total power density.
 - c. Method a) of power density measurement of KDB 662911 is used for calculating total power density with multiple transmitter output. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
4. Refer to section 6.6 for duty cycle spectrum plot. (If duty cycle<98%)

Test procedure

For U-NII-1, U-NII-2A, U-NII-2C band:

Using method as below:

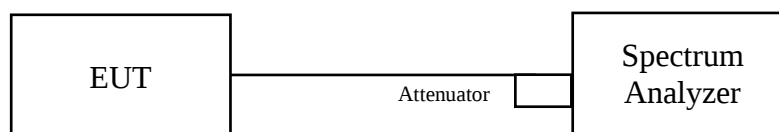
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 1 MHz, Set VBW $\geq$ 3 RBW, Detector = RMS
- Sweep time = auto, trigger set to “free run”.
- Trace average at least 100 traces in power averaging mode.
- Record the max value. (if Duty cycle <98 %, add 10 log (1/duty cycle))
- The plot of the test result only shows the worst case of channels as a representative.

For U-NII-3 band:

Using method as below:

- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 300 kHz, Set VBW $\geq$ 1 MHz, Detector = RMS
- Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
- Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10 log (500 kHz/300kHz)
- Sweep time = auto, trigger set to “free run”.
- Trace average at least 100 traces in power averaging mode.
- Record the max value. (if Duty cycle <98 %, add 10 log (1/duty cycle))
- The plot of the test result only shows the worst case of channels as a representative.

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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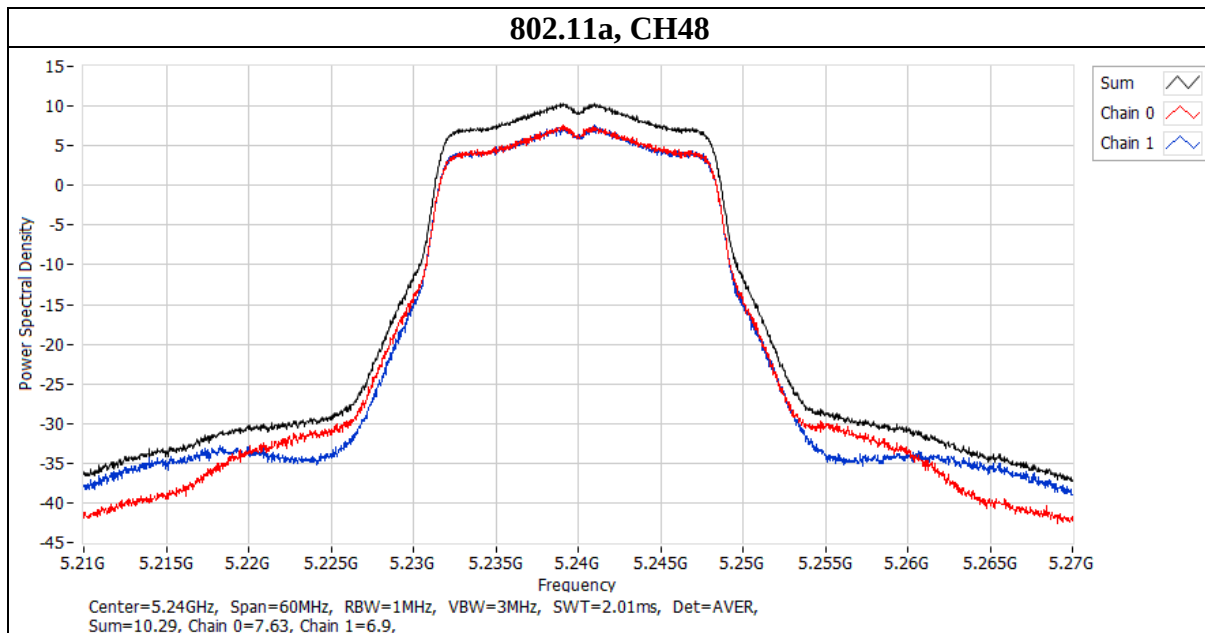
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Test Data

Mode (U-NII-1)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11a	36	5180	6.69	9.98	10.31	PASS
	44	5220	6.69	10.27	10.31	PASS
	48	5240	6.69	10.29	10.31	PASS

Mode (U-NII-1)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11a	36	5180	7.54	6.68
	44	5220	7.69	7.01
	48	5240	7.63	7.58



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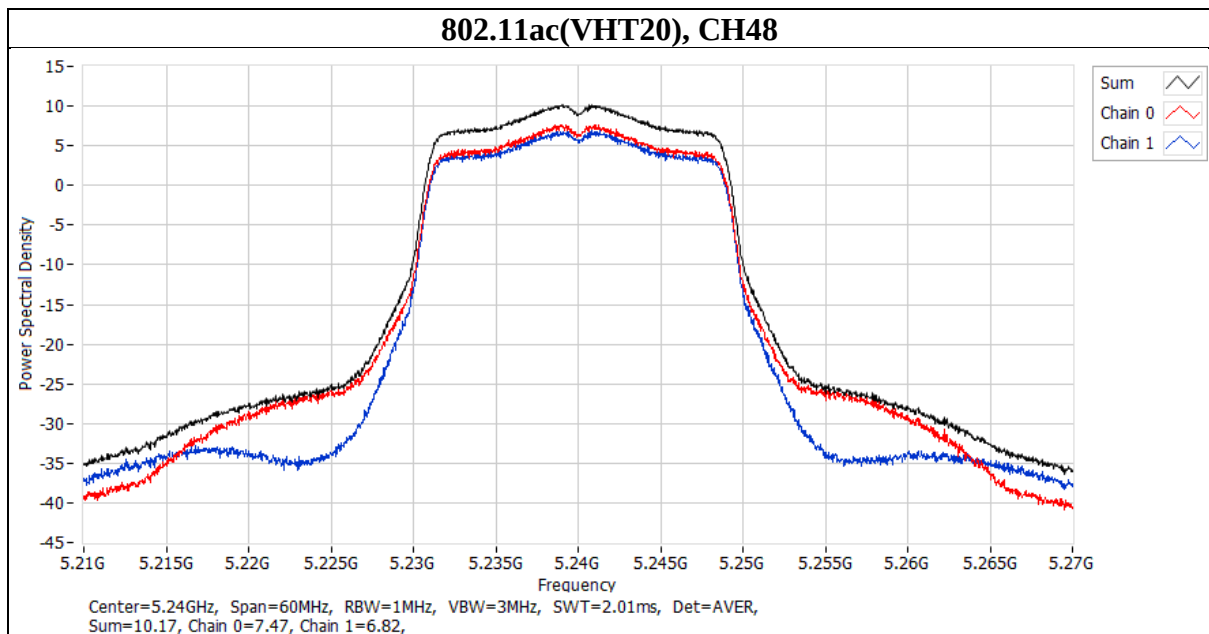
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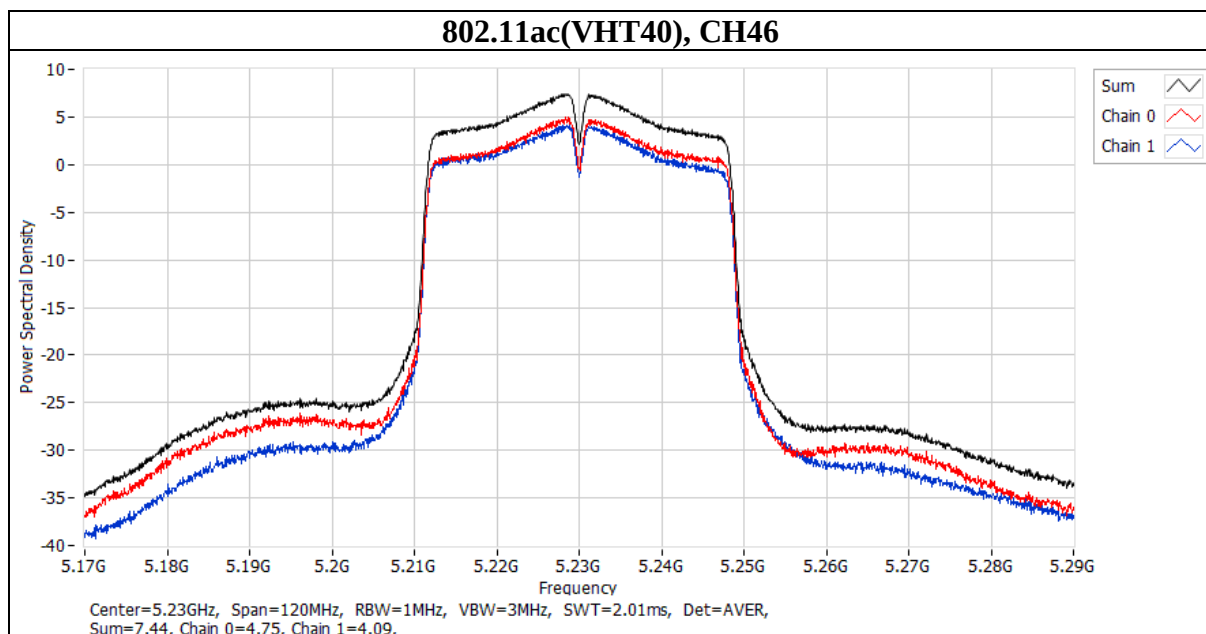
Mode (U-NII-1)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ac(VHT20)	36	5180	6.69	8.11	10.31	PASS
	44	5220	6.69	10.16	10.31	PASS
	48	5240	6.69	10.17	10.31	PASS

Mode (U-NII-1)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ac(VHT20)	36	5180	5.56	4.69
	44	5220	7.47	6.96
	48	5240	7.63	7.06



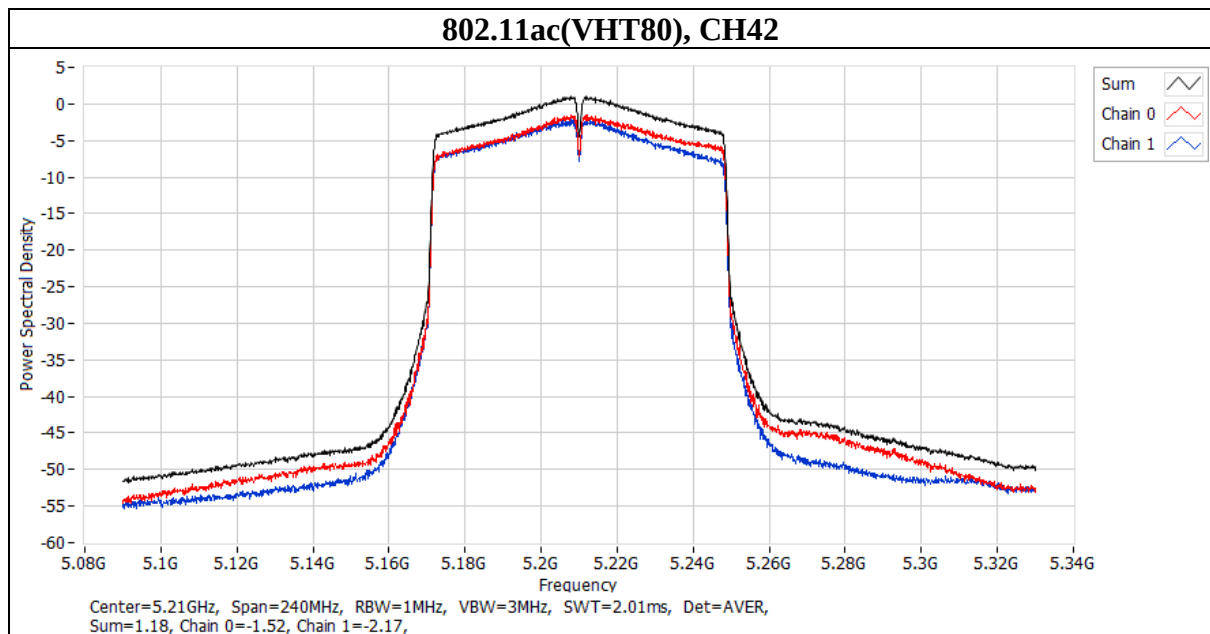
Mode (U-NII-1)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ac(VHT40)	38	5190	6.69	5.38	10.31	PASS
	46	5230	6.69	7.44	10.31	PASS

Mode (U-NII-1)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ac(VHT40)	38	5190	2.89	2.03
	46	5230	4.94	4.16



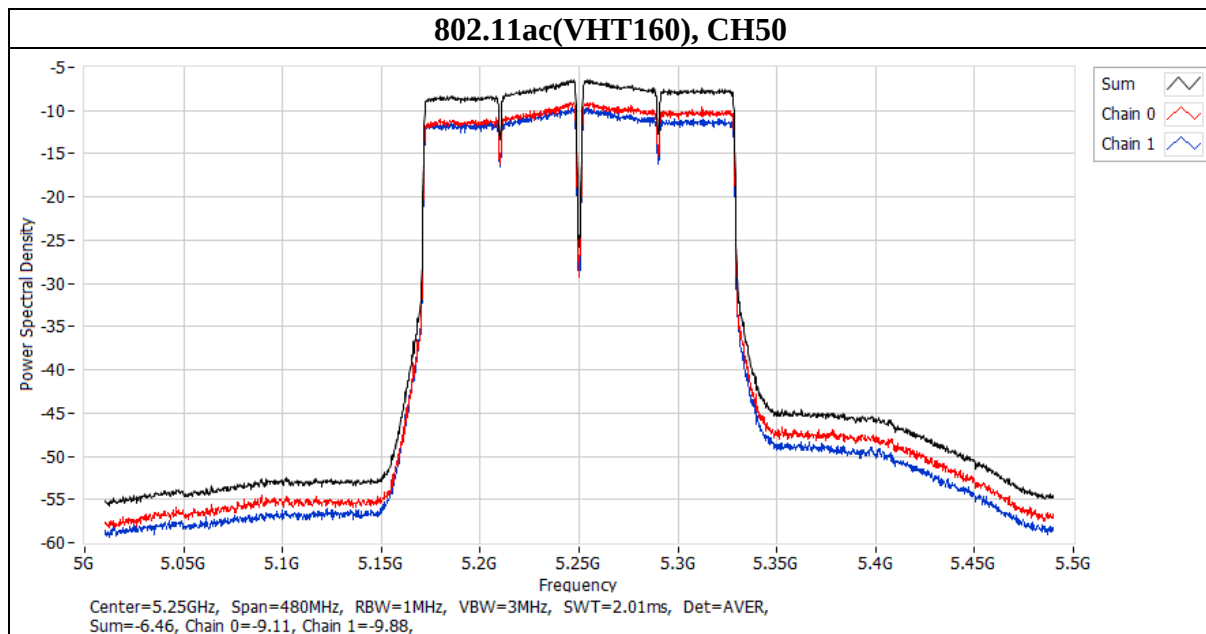
Mode (U-NII-1)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ac(VHT80)	42	5210	6.69	1.18	10.31	PASS

Mode (U-NII-1)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ac(VHT80)	42	5210	-1.47	-2.17



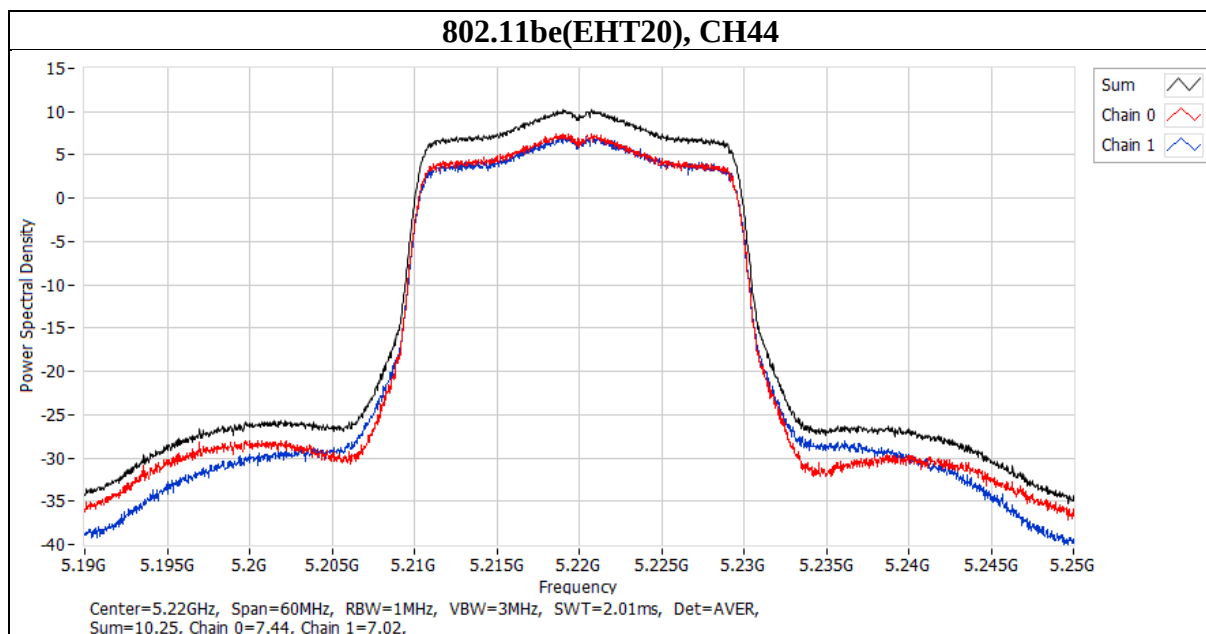
Mode (U-NII-1)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ac(VHT160)	50	5250	6.69	-6.46	10.31	PASS

Mode (U-NII-1)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ac(VHT160)	50	5250	-9.09	-9.61



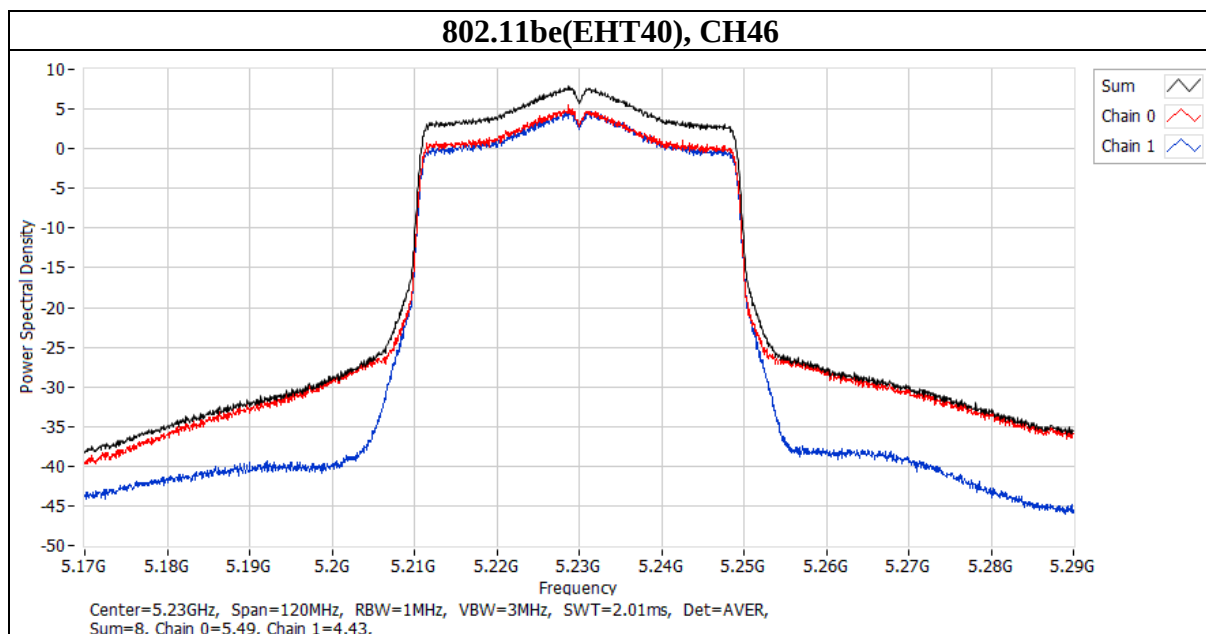
Mode (U-NII-1)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11be(EHT20)	36	5180	6.69	8.64	10.31	PASS
	44	5220	6.69	10.25	10.31	PASS
	48	5240	6.69	10.24	10.31	PASS

Mode (U-NII-1)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11be(EHT20)	36	5180	6.06	5.24
	44	5220	7.44	7.11
	48	5240	7.71	7.04



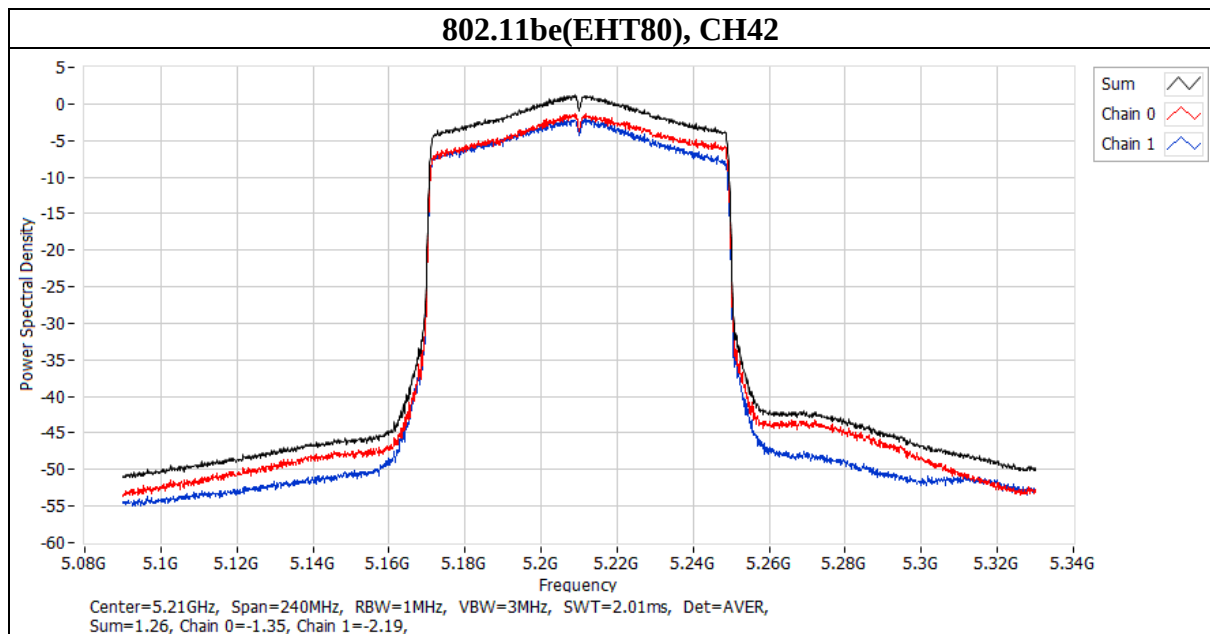
Mode (U-NII-1)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11be(EHT40)	38	5190	6.69	5.85	10.31	PASS
	46	5230	6.69	8	10.31	PASS

Mode (U-NII-1)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11be(EHT40)	38	5190	3.54	2.47
	46	5230	5.49	4.65



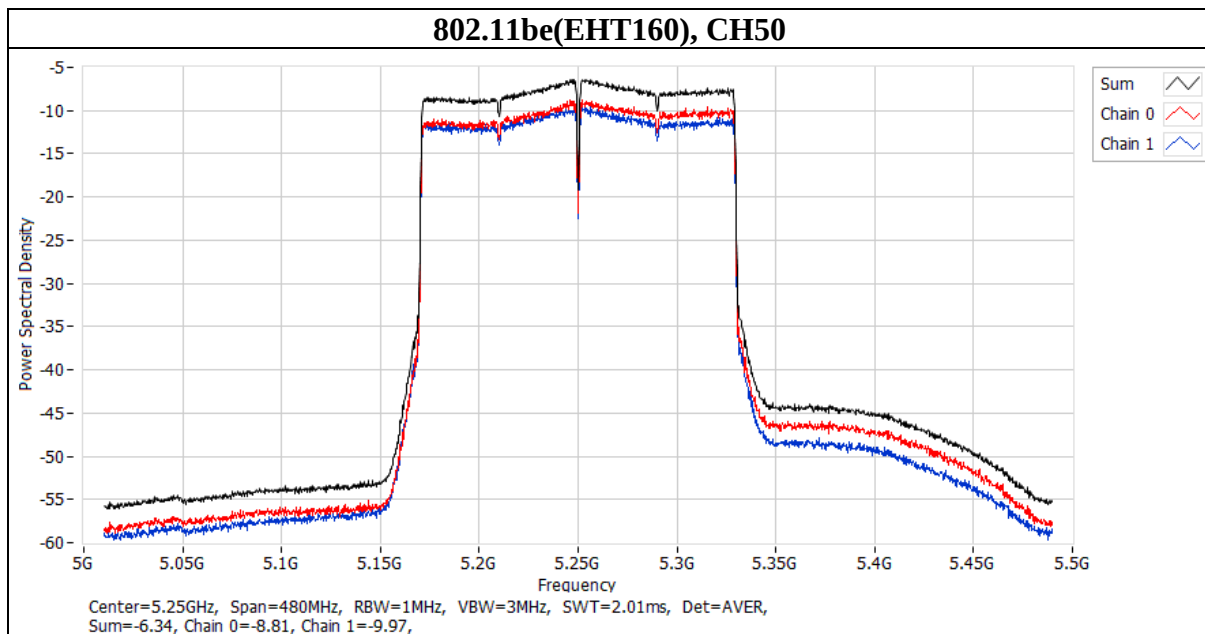
Mode (U-NII-1)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11be(EHT80)	42	5210	6.69	1.26	10.31	PASS

Mode (U-NII-1)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11be(EHT80)	42	5210	-1.35	-2.01



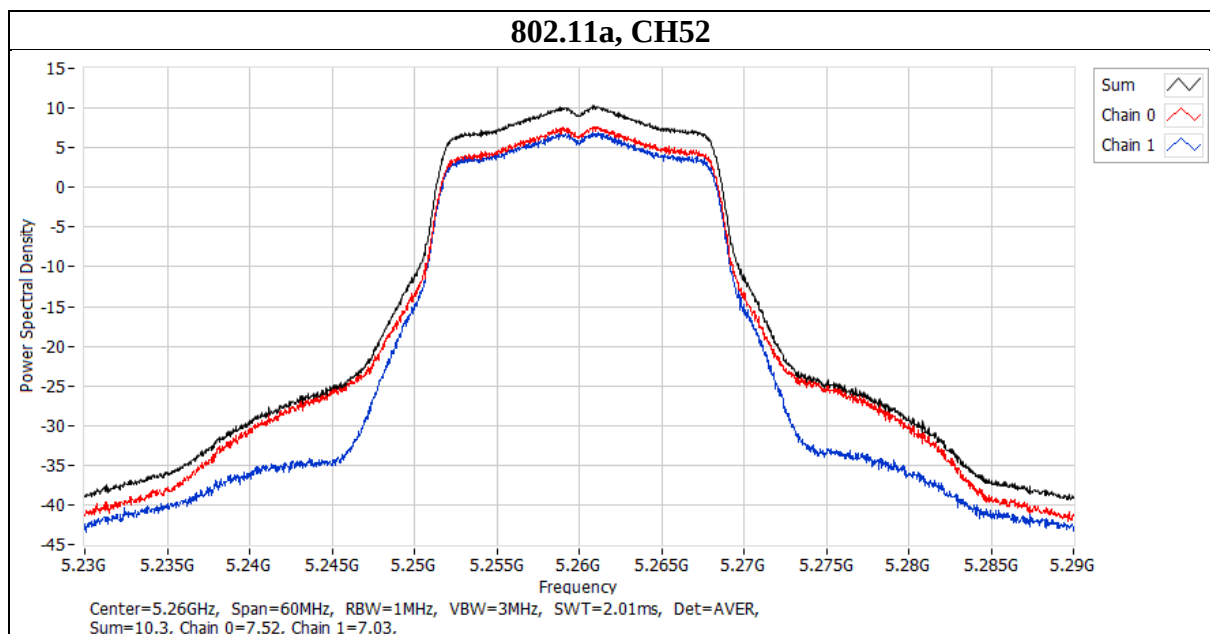
Mode (U-NII-1)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11be(EHT160)	50	5250	6.69	-6.34	10.31	PASS

Mode (U-NII-1)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11be(EHT160)	50	5250	-8.81	-9.62



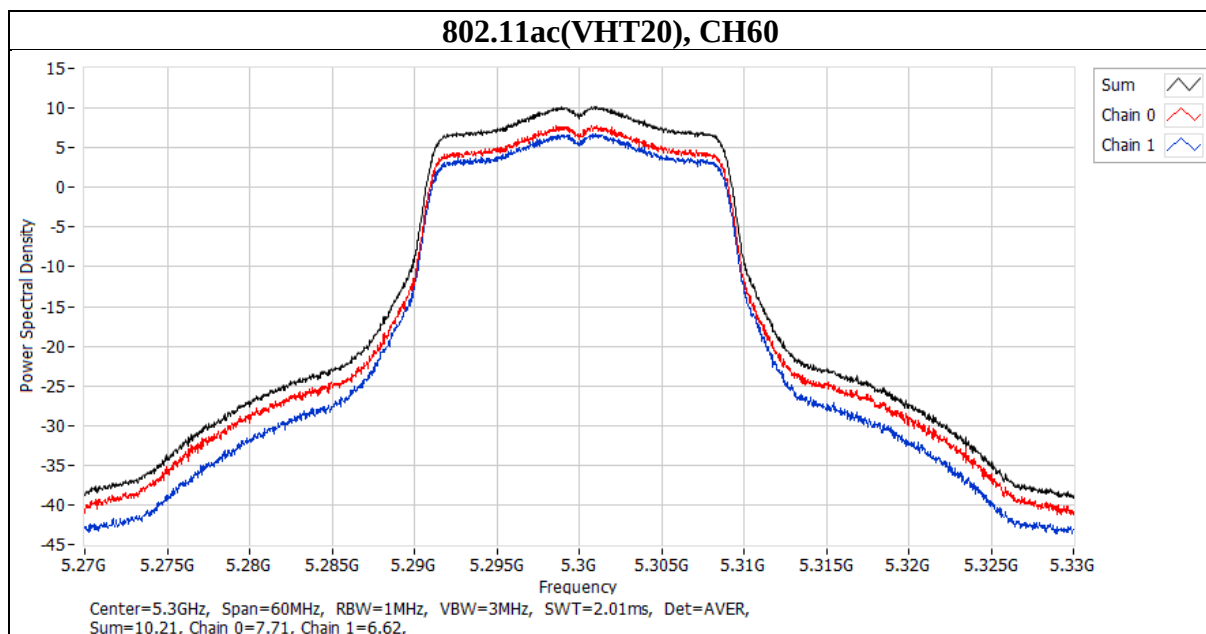
Mode (U-NII-2A)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11a	52	5260	6.69	10.3	10.31	PASS
	60	5300	6.69	10.23	10.31	PASS
	64	5320	6.69	9.33	10.31	PASS

Mode (U-NII-2A)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11a	52	5260	7.68	7.03
	60	5300	7.65	7.12
	64	5320	6.76	6.13



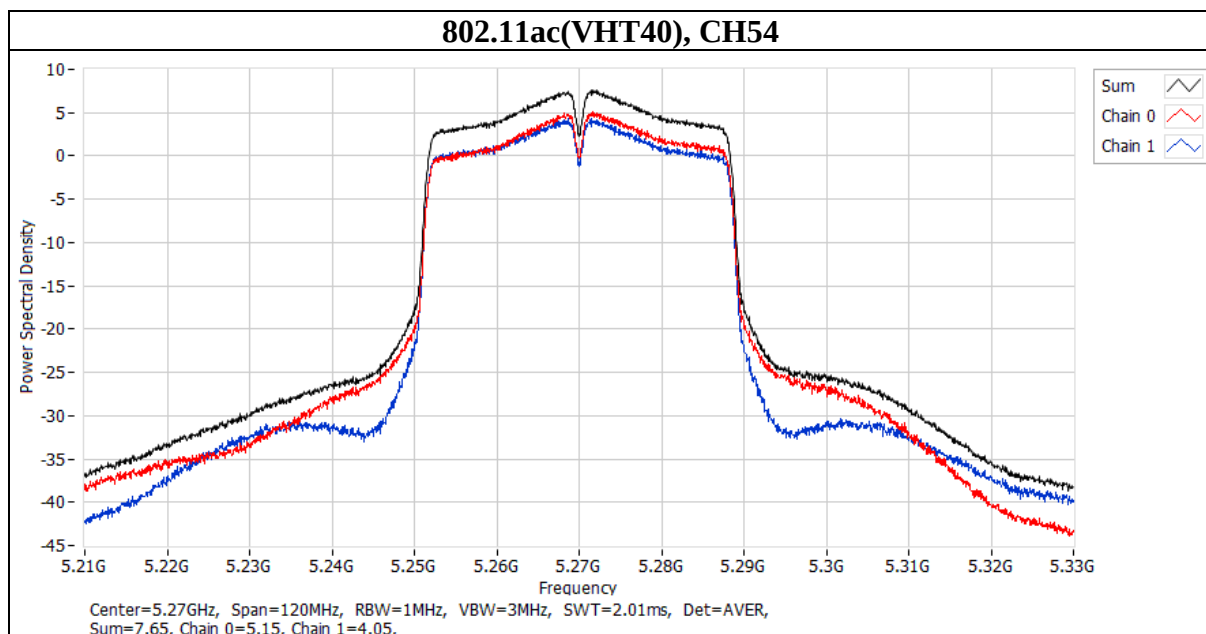
Mode (U-NII-2A)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ac(VHT20)	52	5260	6.69	10.17	10.31	PASS
	60	5300	6.69	10.21	10.31	PASS
	64	5320	6.69	8.49	10.31	PASS

Mode (U-NII-2A)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ac(VHT20)	52	5260	7.69	7.02
	60	5300	7.74	6.77
	64	5320	6.16	5.24



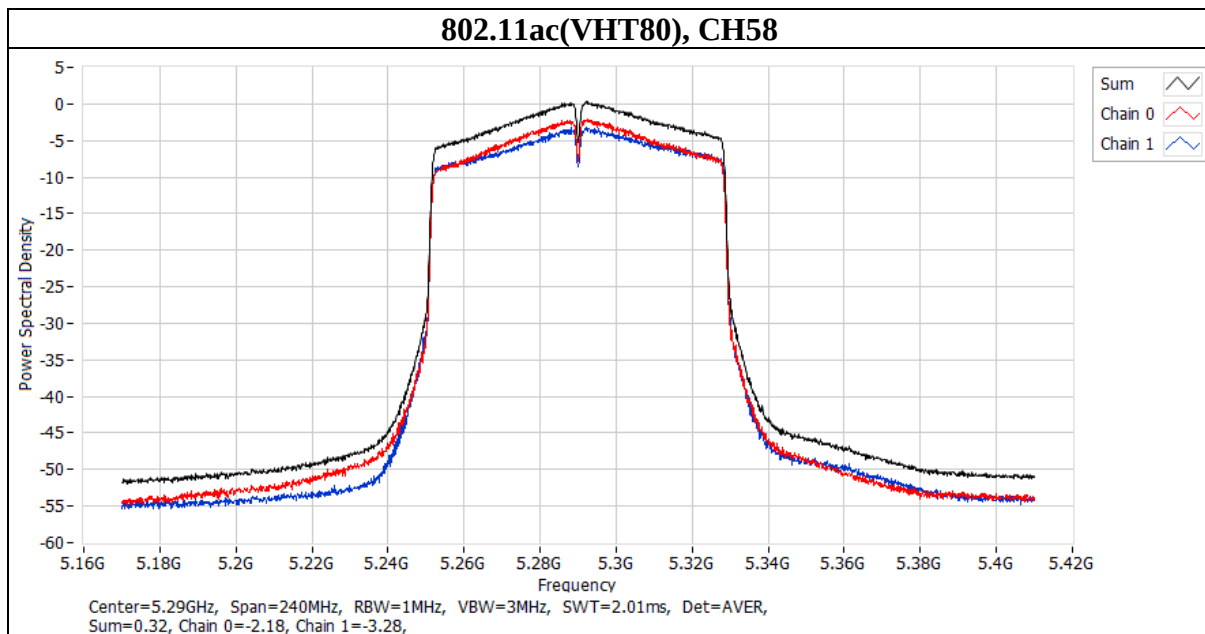
Mode (U-NII-2A)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ac(VHT40)	54	5270	6.69	7.65	10.31	PASS
	62	5310	6.69	5.02	10.31	PASS

Mode (U-NII-2A)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ac(VHT40)	54	5270	5.15	4.32
	62	5310	2.47	1.62



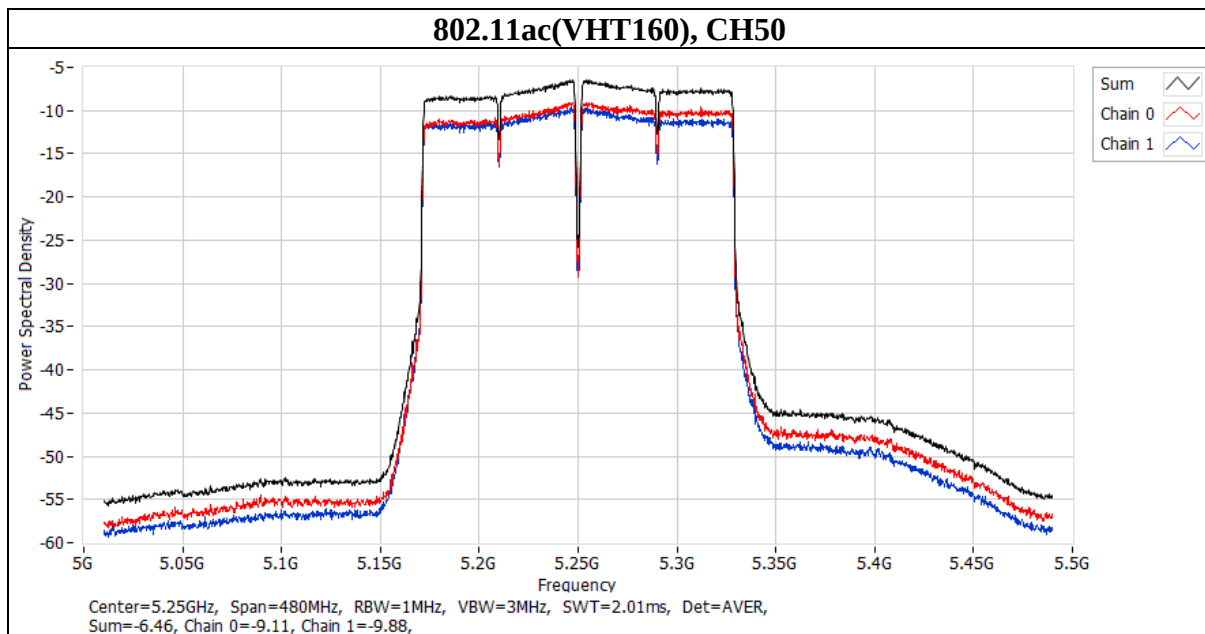
Mode (U-NII-2A)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ac(VHT80)	58	5290	6.69	0.32	10.31	PASS

Mode (U-NII-2A)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ac(VHT80)	58	5290	-2.05	-3.21



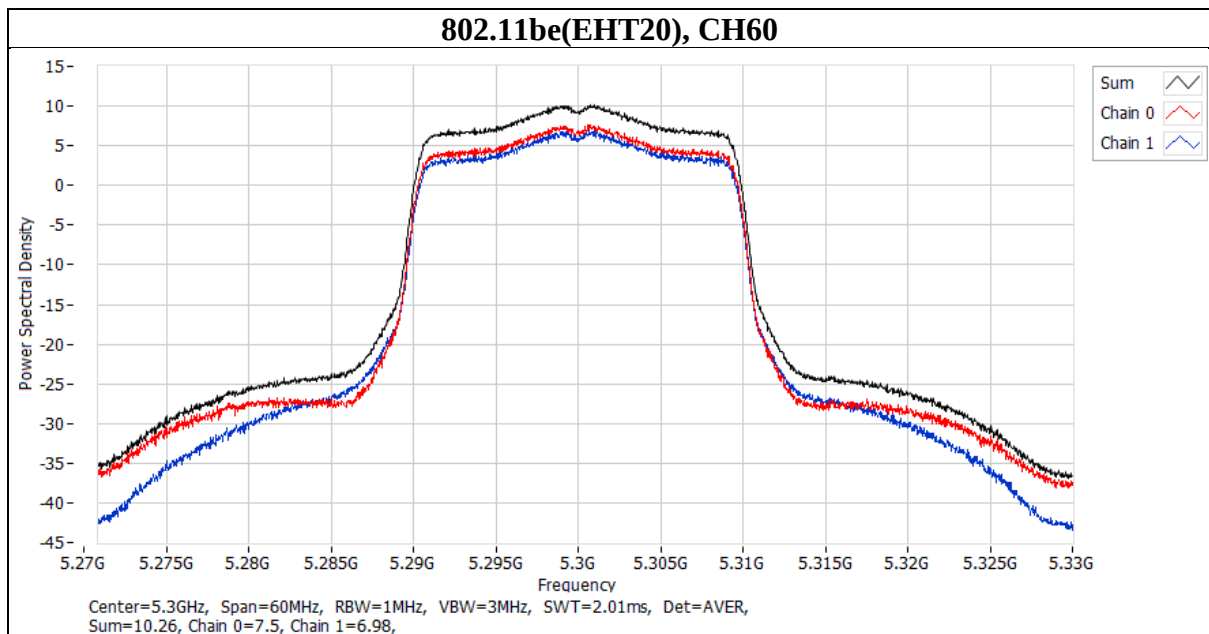
Mode (U-NII-2A)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ac(VHT160)	50	5250	6.69	-6.46	10.31	PASS

Mode (U-NII-2A)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ac(VHT160)	50	5250	-9.09	-9.61



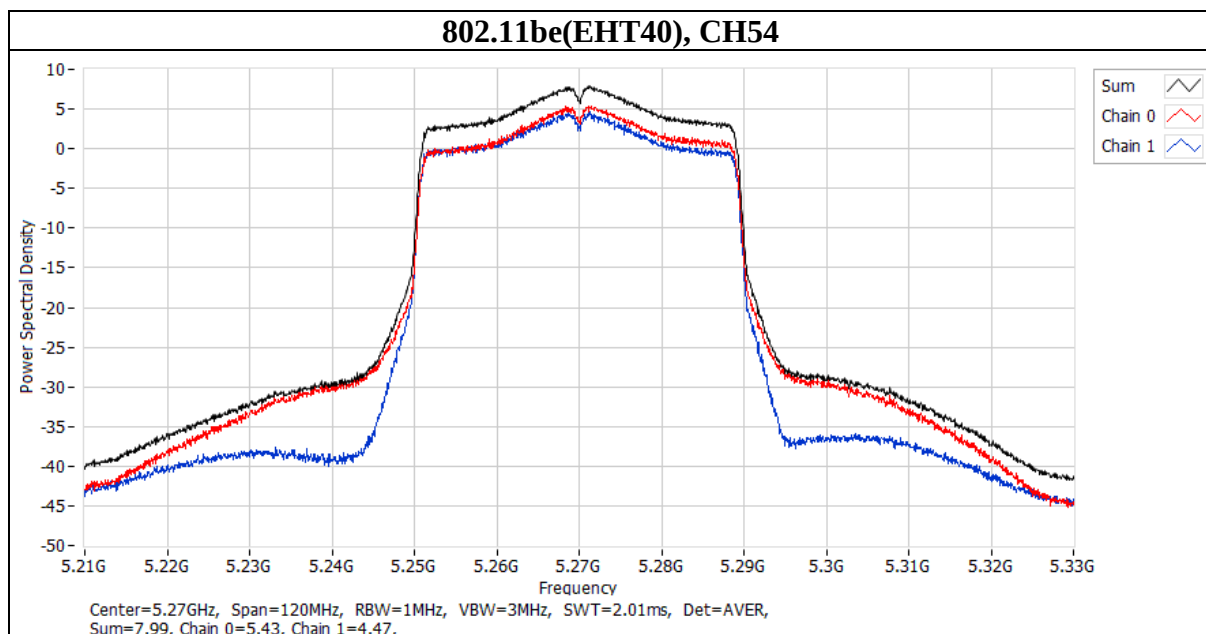
Mode (U-NII-2A)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11be(EHT20)	52	5260	6.69	10.19	10.31	PASS
	60	5300	6.69	10.26	10.31	PASS
	64	5320	6.69	9.17	10.31	PASS

Mode (U-NII-2A)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11be(EHT20)	52	5260	7.48	7.28
	60	5300	7.66	6.98
	64	5320	6.69	5.93



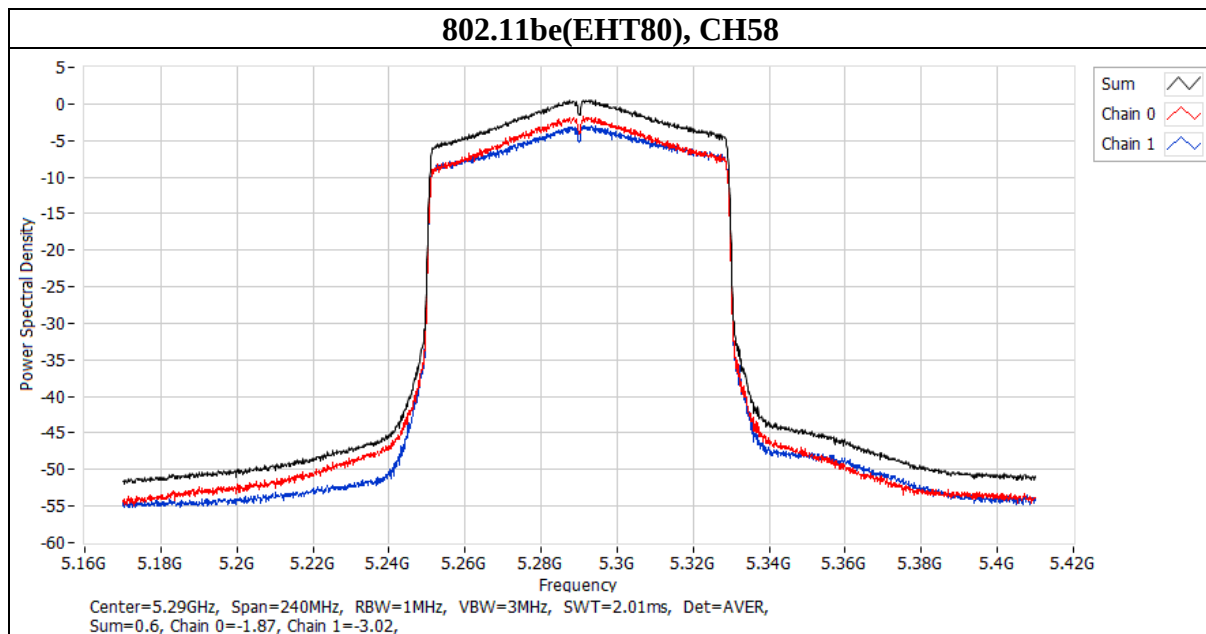
Mode (U-NII-2A)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11be(EHT40)	54	5270	6.69	7.99	10.31	PASS
	62	5310	6.69	5.47	10.31	PASS

Mode (U-NII-2A)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11be(EHT40)	54	5270	5.43	4.61
	62	5310	3.34	2.19



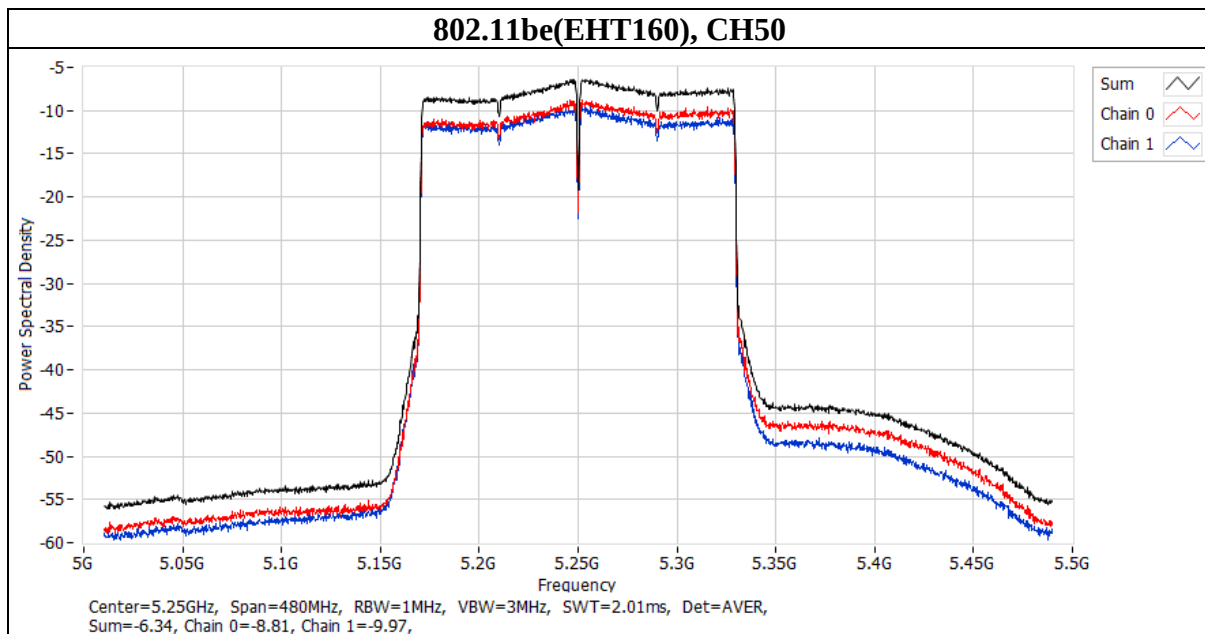
Mode (U-NII-2A)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11be(EHT80)	58	5290	6.69	0.6	10.31	PASS

Mode (U-NII-2A)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11be(EHT80)	58	5290	-1.77	-2.92



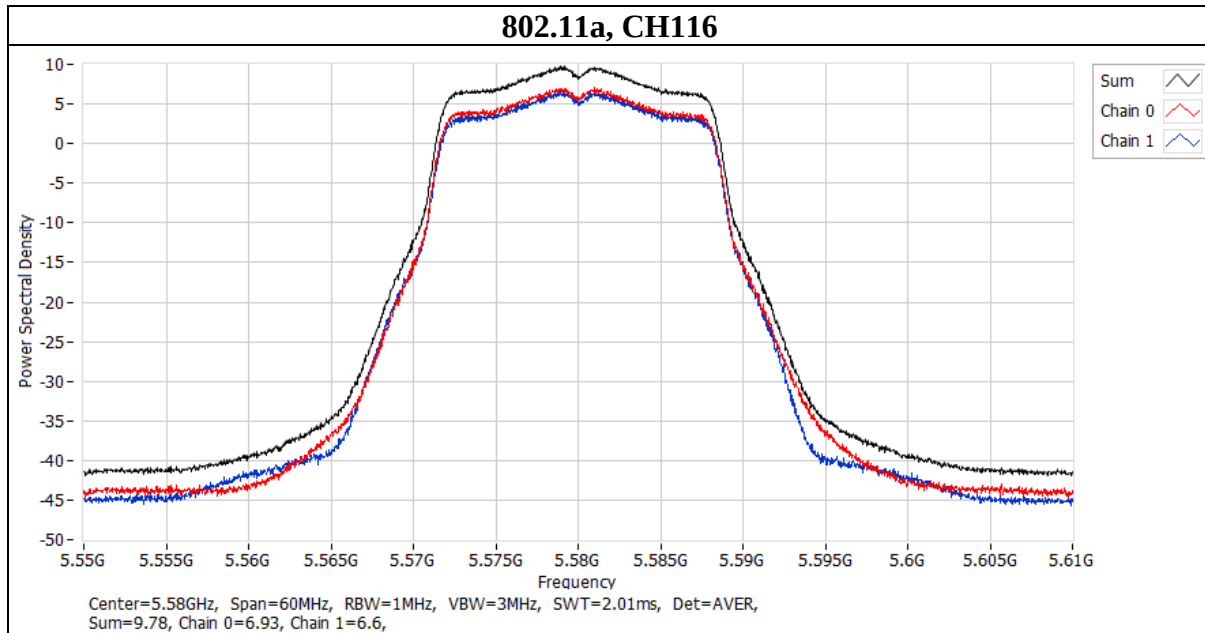
Mode (U-NII-2A)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11be(EHT160)	50	5250	6.69	-6.34	10.31	PASS

Mode (U-NII-2A)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11be(EHT160)	50	5250	-8.81	-9.62



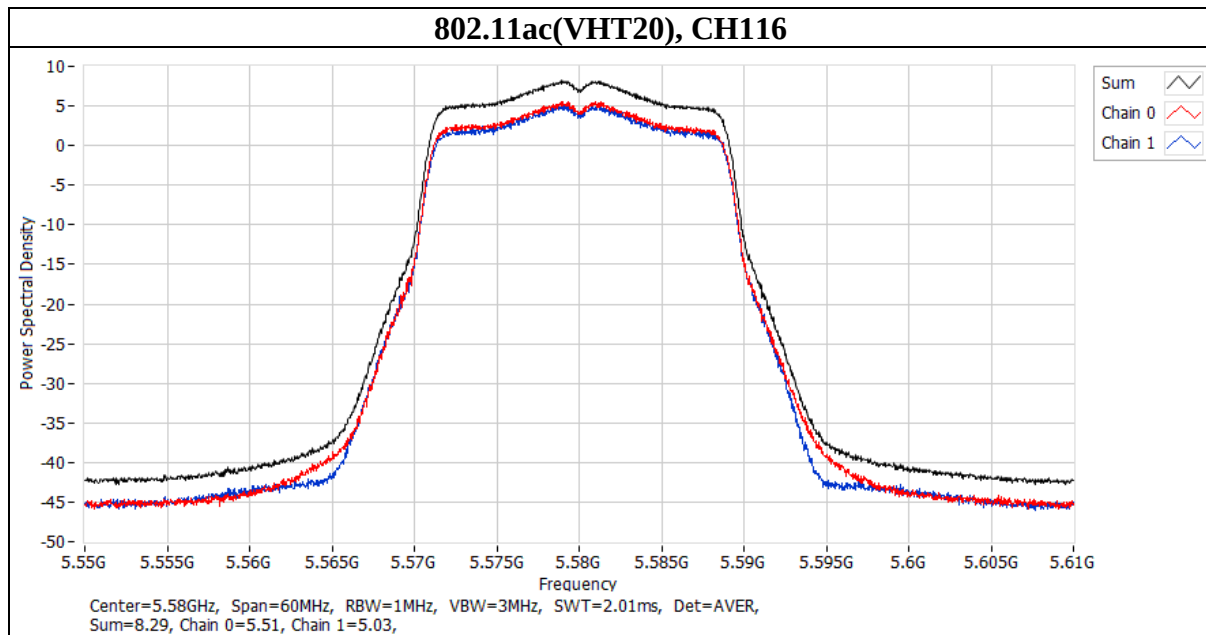
Mode (U-NII-2C)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11a	100	5500	6.69	9.05	10.31	PASS
	116	5580	6.69	9.78	10.31	PASS
	140	5700	6.69	9.3	10.31	PASS
	144	5720	6.69	8.84	10.31	PASS

Mode (U-NII-2C)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11a	100	5500	6.67	5.66
	116	5580	7.08	6.6
	140	5700	6.52	6.4
	144	5720	6.23	5.76



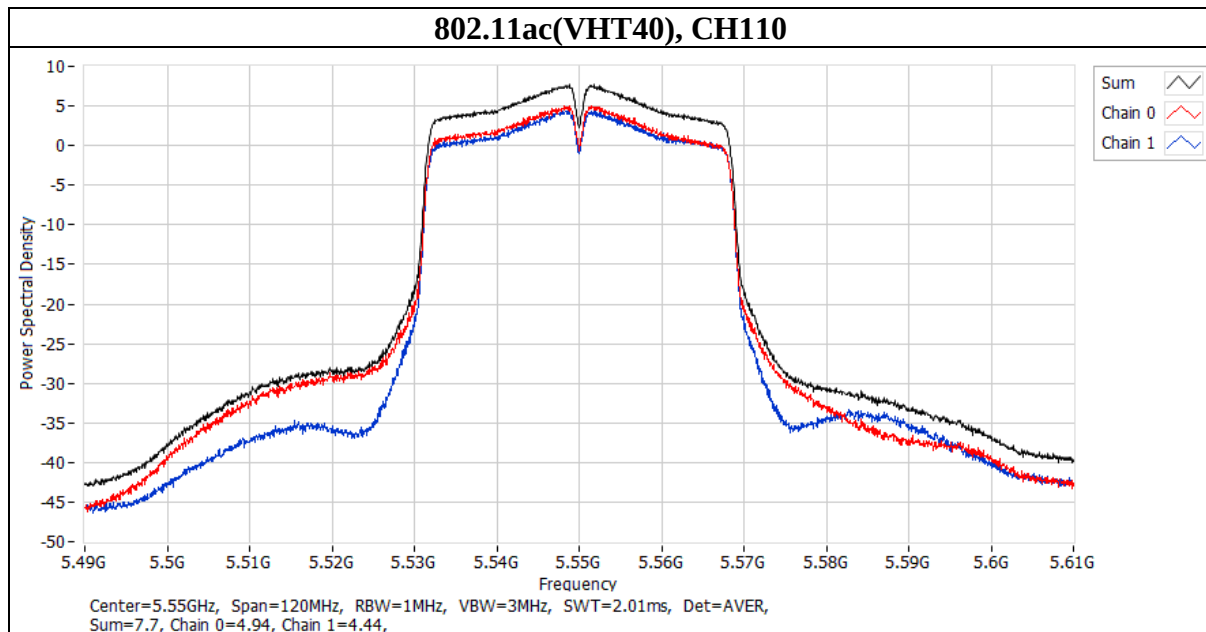
Mode (U-NII-2C)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ac(VHT20)	100	5500	6.69	7.89	10.31	PASS
	116	5580	6.69	8.29	10.31	PASS
	140	5700	6.69	5.92	10.31	PASS
	144	5720	6.69	7.82	10.31	PASS

Mode (U-NII-2C)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ac(VHT20)	100	5500	5.38	4.63
	116	5580	5.6	5.16
	140	5700	3.11	2.83
	144	5720	5.15	4.68



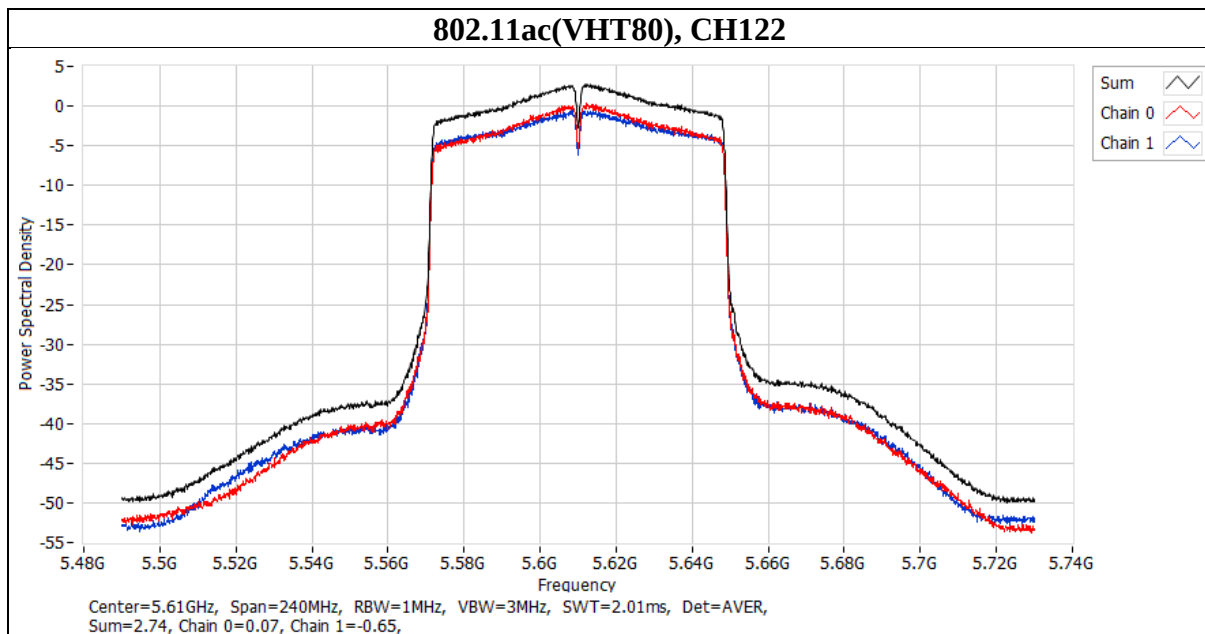
Mode (U-NII-2C)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ac(VHT40)	102	5510	6.69	4.98	10.31	PASS
	110	5550	6.69	7.7	10.31	PASS
	134	5670	6.69	6.78	10.31	PASS
	142	5710	6.69	6.52	10.31	PASS

Mode (U-NII-2C)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ac(VHT40)	102	5510	2.32	1.58
	110	5550	5.02	4.5
	134	5670	3.85	3.75
	142	5710	3.57	3.61



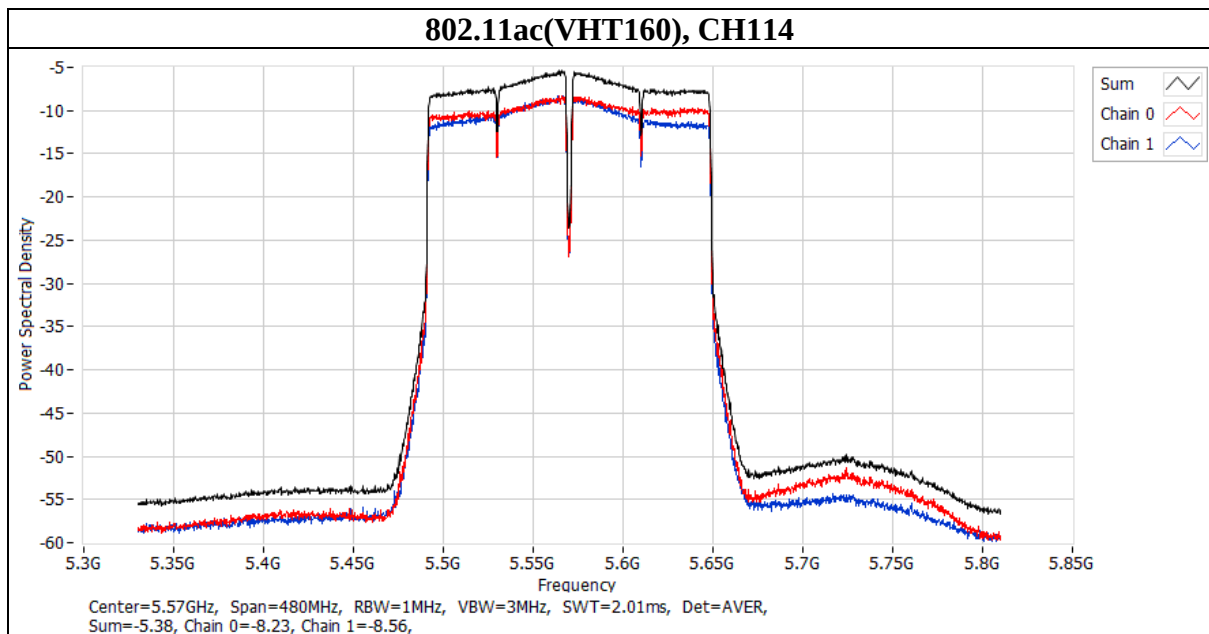
Mode (U-NII-2C)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ac(VHT80)	106	5530	6.69	0.94	10.31	PASS
	122	5610	6.69	2.74	10.31	PASS
	138	5690	6.69	2.62	10.31	PASS

Mode (U-NII-2C)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ac(VHT80)	106	5530	-1.49	-2.47
	122	5610	0.28	-0.48
	138	5690	-0.35	-0.23



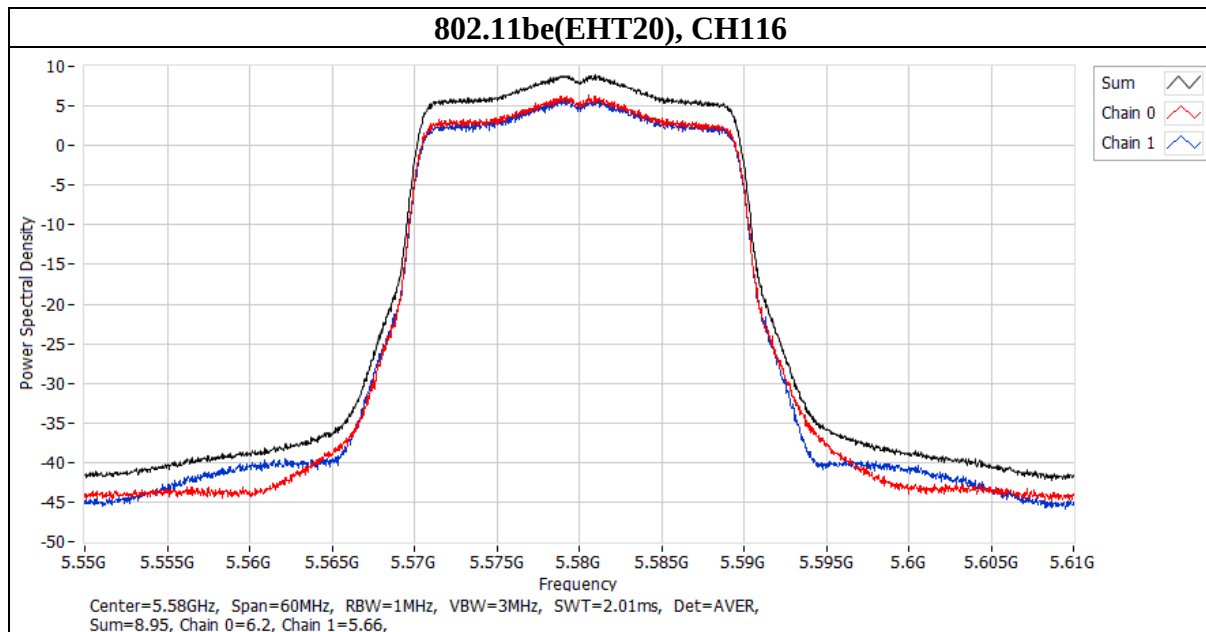
Mode (U-NII-2C)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ac(VHT160)	114	5570	6.69	-5.38	10.31	PASS

Mode (U-NII-2C)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ac(VHT160)	114	5570	-8.23	-8.36



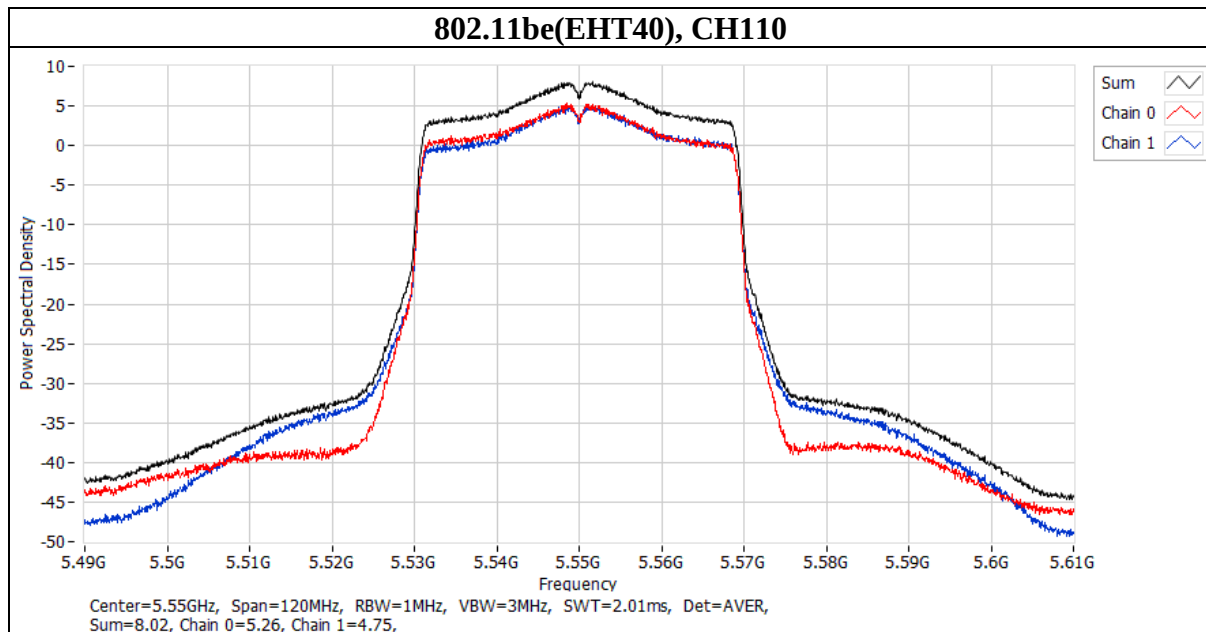
Mode (U-NII-2C)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11be(EHT20)	100	5500	6.69	8.63	10.31	PASS
	116	5580	6.69	8.95	10.31	PASS
	140	5700	6.69	6.52	10.31	PASS
	144	5720	6.69	8.54	10.31	PASS

Mode (U-NII-2C)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11be(EHT20)	100	5500	6	5.44
	116	5580	6.4	5.95
	140	5700	3.85	3.48
	144	5720	5.95	5.38



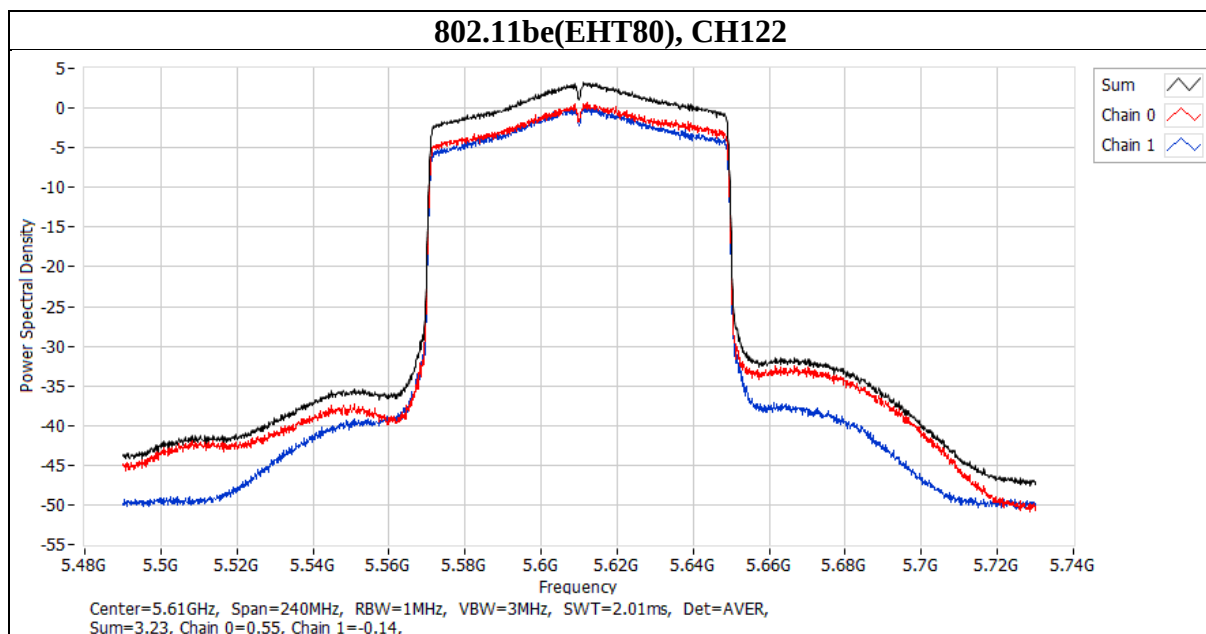
Mode (U-NII-2C)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11be(EHT40)	102	5510	6.69	5.17	10.31	PASS
	110	5550	6.69	8.02	10.31	PASS
	134	5670	6.69	7.12	10.31	PASS
	142	5710	6.69	7.06	10.31	PASS

Mode (U-NII-2C)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11be(EHT40)	102	5510	2.66	1.86
	110	5550	5.29	5.1
	134	5670	4.25	4.2
	142	5710	4.12	4.35



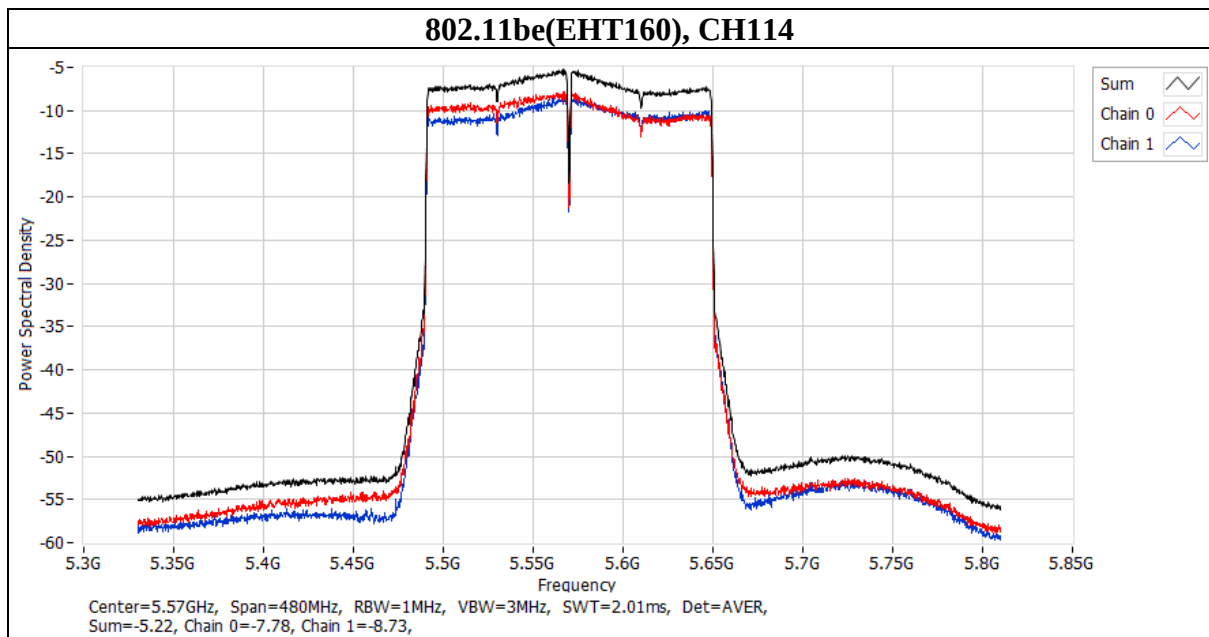
Mode (U-NII-2C)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11be(EHT80)	106	5530	6.69	0.97	10.31	PASS
	122	5610	6.69	3.23	10.31	PASS
	138	5690	6.69	2.89	10.31	PASS

Mode (U-NII-2C)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11be(EHT80)	106	5530	-1.59	-2.3
	122	5610	0.64	0.1
	138	5690	0.06	-0.22



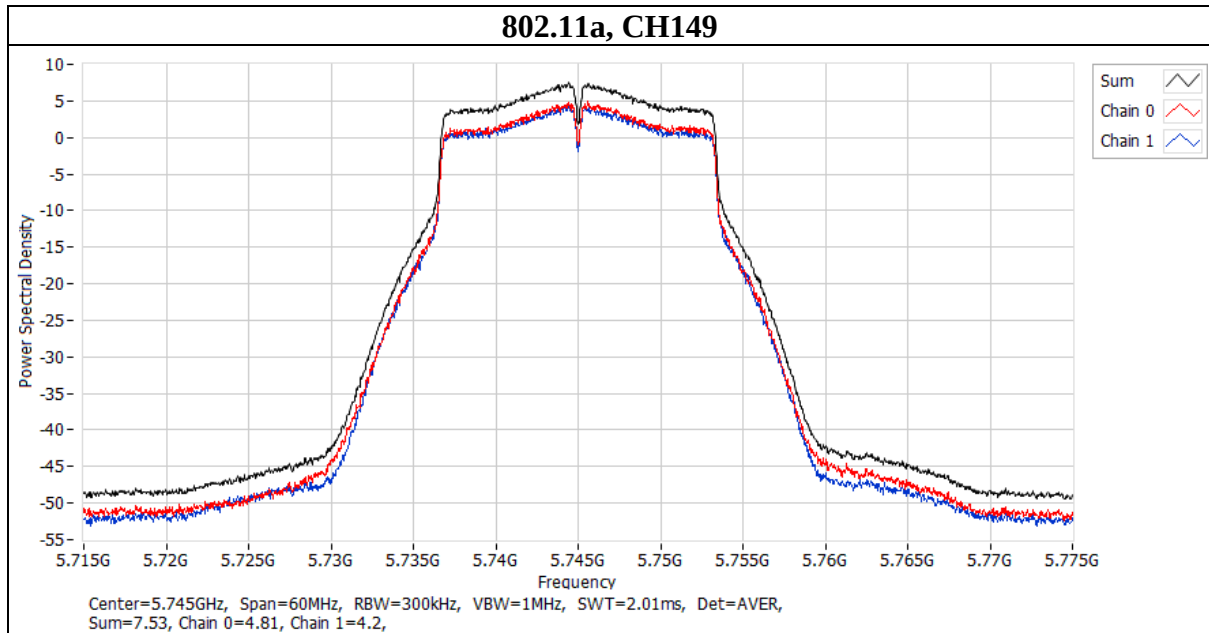
Mode (U-NII-2C)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11be(EHT160)	114	5570	6.69	-5.22	10.31	PASS

Mode (U-NII-2C)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11be(EHT160)	114	5570	-7.78	-8.26



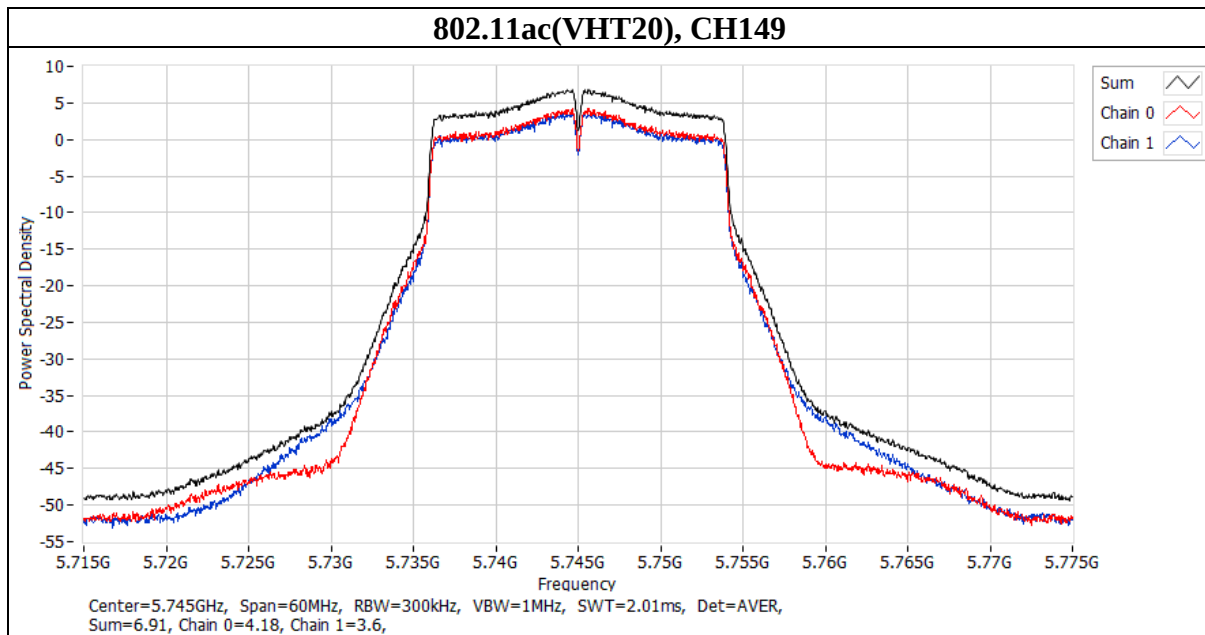
Mode (U-NII-3)	CH	Freq (MHz)	BWCF	Directional Gain (dBi)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
802.11a	144	5720	2.22	6.69	8.84	29.31	PASS
	149	5745	2.22	6.69	9.74	29.31	PASS
	157	5785	2.22	6.69	9.32	29.31	PASS
	165	5825	2.22	6.69	9.64	29.31	PASS

Mode (U-NII-3)	CH	Freq (MHz)	PSD per Chain (dBm/500kHz)	
			Chain 0	Chain 1
802.11a	144	5720	3.9	3.7
	149	5745	4.88	4.2
	157	5785	4.3	4.06
	165	5825	4.74	4.22



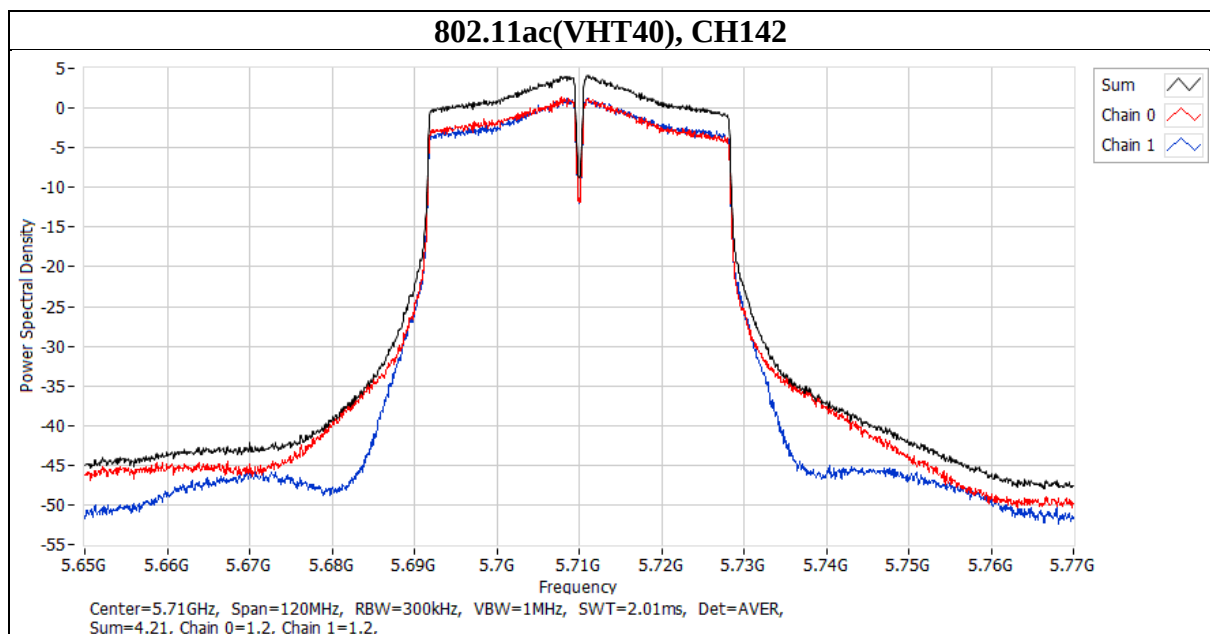
Mode (U-NII-3)	CH	Freq (MHz)	BWCF	Directional Gain (dBi)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
802.11ac(VHT20)	144	5720	2.22	6.69	7.7	29.31	PASS
	149	5745	2.22	6.69	9.13	29.31	PASS
	157	5785	2.22	6.69	9.03	29.31	PASS
	165	5825	2.22	6.69	9.04	29.31	PASS

Mode (U-NII-3)	CH	Freq (MHz)	PSD per Chain (dBm/500kHz)	
			Chain 0	Chain 1
802.11ac(VHT20)	144	5720	2.71	2.44
	149	5745	4.25	3.76
	157	5785	3.97	3.84
	165	5825	4	3.87



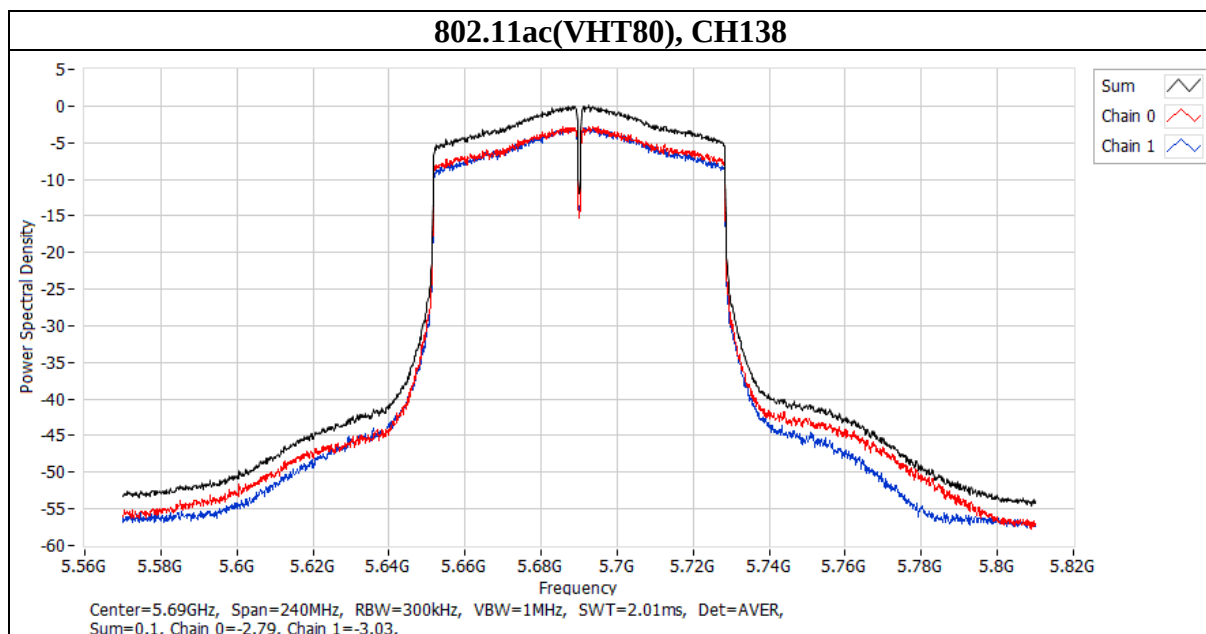
Mode (U-NII-3)	CH	Freq (MHz)	BWCF	Directional Gain (dBi)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
802.11ac(VHT40)	142	5710	2.22	6.69	6.43	29.31	PASS
	151	5755	2.22	6.69	6.16	29.31	PASS
	159	5795	2.22	6.69	6.08	29.31	PASS

Mode (U-NII-3)	CH	Freq (MHz)	PSD per Chain (dBm/500kHz)	
			Chain 0	Chain 1
802.11ac(VHT40)	142	5710	1.33	1.25
	151	5755	1.16	0.81
	159	5795	1.07	0.7



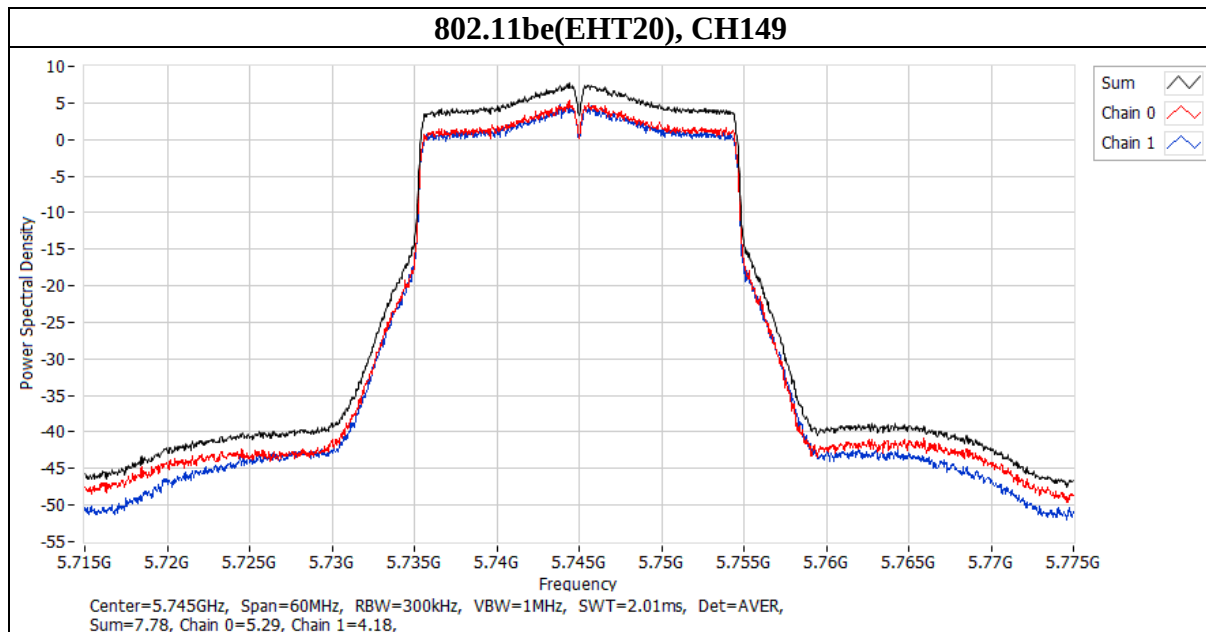
Mode (U-NII-3)	CH	Freq (MHz)	BWCF	Directional Gain (dBi)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
802.11ac(VHT80)	138	5690	2.22	6.69	2.32	29.31	PASS
	155	5775	2.22	6.69	1.92	29.31	PASS

Mode (U-NII-3)	CH	Freq (MHz)	PSD per Chain (dBm/500kHz)	
			Chain 0	Chain 1
802.11ac(VHT80)	138	5690	-2.79	-2.95
	155	5775	-2.94	-3.33



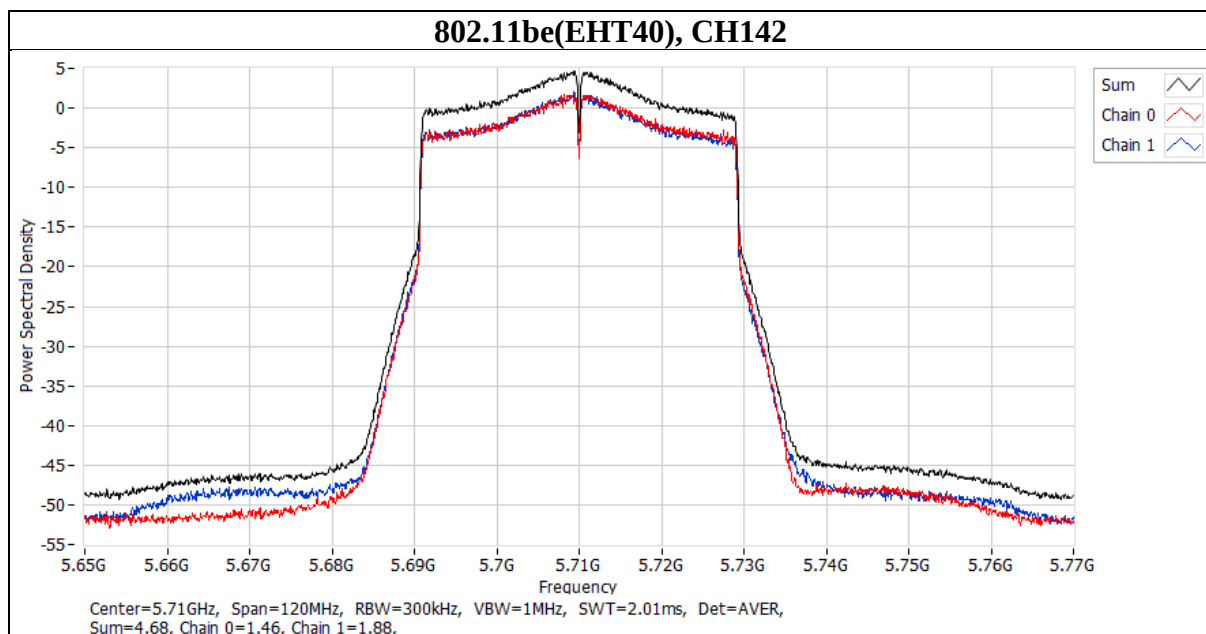
Mode (U-NII-3)	CH	Freq (MHz)	BWCF	Directional Gain (dBi)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
802.11be(EHT20)	144	5720	2.22	6.69	8.62	29.31	PASS
	149	5745	2.22	6.69	10	29.31	PASS
	157	5785	2.22	6.69	9.79	29.31	PASS
	165	5825	2.22	6.69	9.99	29.31	PASS

Mode (U-NII-3)	CH	Freq (MHz)	PSD per Chain (dBm/500kHz)	
			Chain 0	Chain 1
802.11be(EHT20)	144	5720	3.7	3.4
	149	5745	5.29	4.78
	157	5785	4.84	4.64
	165	5825	5.12	4.66



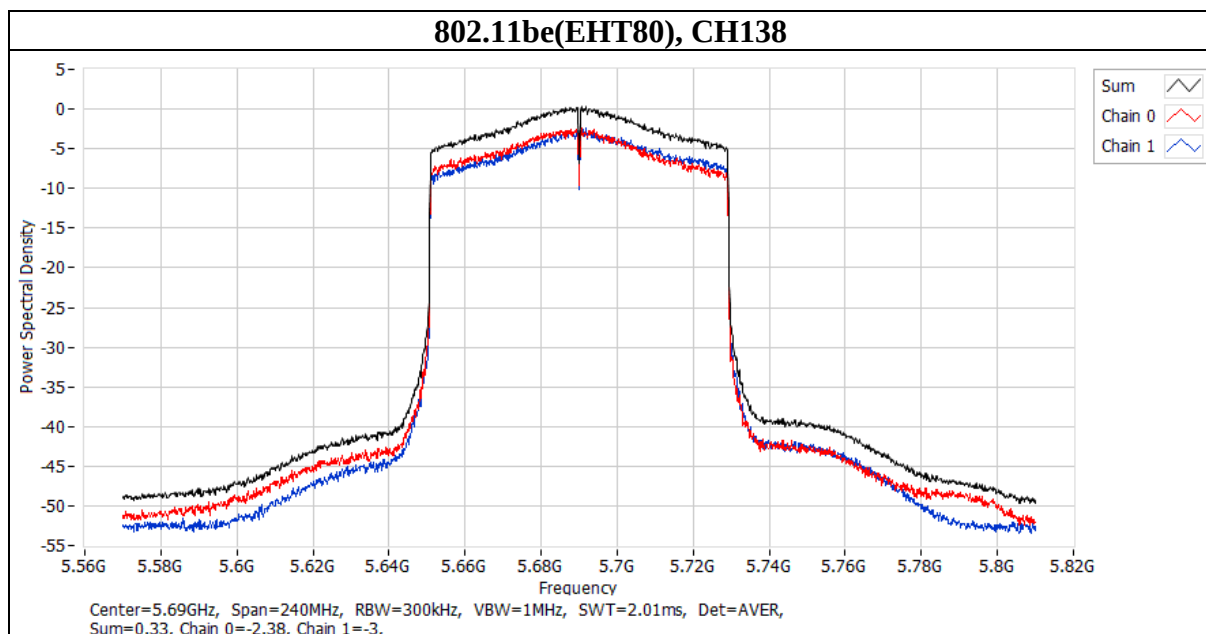
Mode (U-NII-3)	CH	Freq (MHz)	BWCF	Directional Gain (dBi)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
802.11be(EHT40)	142	5710	2.22	6.69	6.9	29.31	PASS
	151	5755	2.22	6.69	6.63	29.31	PASS
	159	5795	2.22	6.69	6.42	29.31	PASS

Mode (U-NII-3)	CH	Freq (MHz)	PSD per Chain (dBm/500kHz)	
			Chain 0	Chain 1
802.11be(EHT40)	142	5710	1.72	2.03
	151	5755	1.91	1.32
	159	5795	1.37	1.34



Mode (U-NII-3)	CH	Freq (MHz)	BWCF	Directional Gain (dBi)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
802.11be(EHT80)	138	5690	2.22	6.69	2.55	29.31	PASS
	155	5775	2.22	6.69	2.25	29.31	PASS

Mode (U-NII-3)	CH	Freq (MHz)	PSD per Chain (dBm/500kHz)	
			Chain 0	Chain 1
802.11be(EHT80)	138	5690	-2.38	-2.44
	155	5775	-2.34	-3.2



9.6. Frequency Stability

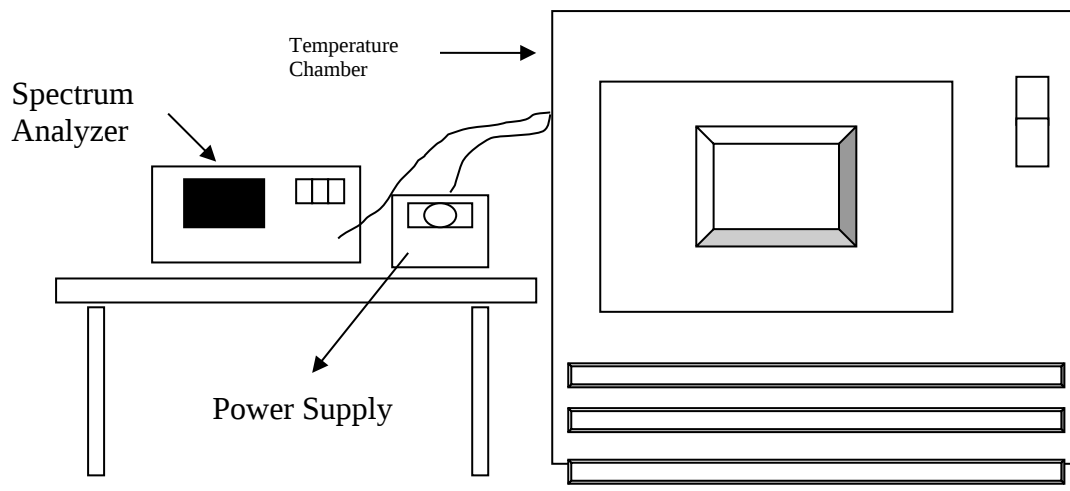
Requirements

The frequency of the carrier signal shall be maintained within band of operation.

Test procedure

- The EUT was placed inside the environmental test chamber and powered by nominal voltage.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 Minutes.
- Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 Minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

Test Setup



Test Data

Frequency Stability Versus Temp.									
Operating Frequency: 5180 MHz									
TEMP. (°C)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)
50	3.3	5179.9726	-5.29	5179.9732	-5.17	5179.9751	-4.81	5179.9737	-5.08
40	3.3	5180.0175	3.38	5180.017	3.28	5180.0165	3.19	5180.0201	3.88
30	3.3	5179.9822	-3.44	5179.9856	-2.78	5179.9846	-2.97	5179.9832	-3.24
20	3.3	5179.9987	-0.25	5179.9962	-0.73	5180.0011	0.21	5179.9976	-0.46
10	3.3	5180.013	2.51	5180.0141	2.72	5180.0166	3.20	5180.0166	3.20
0	3.3	5180.0114	2.20	5180.007	1.35	5180.009	1.74	5180.0065	1.25
-10	3.3	5180.0207	4.00	5180.0177	3.42	5180.0164	3.17	5180.0176	3.40
-20	3.3	5180.0215	4.15	5180.019	3.67	5180.0203	3.92	5180.0179	3.46
-30	3.3	5180.0054	1.04	5180.0038	0.73	5180.0041	0.79	5180.0063	1.22
TEMP. (°C)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)
20	3.795	5179.9991	-0.17	5179.9953	-0.91	5180.0004	0.08	5179.9977	-0.44
20	3.3	5179.9987	-0.25	5179.9962	-0.73	5180.0011	0.21	5179.9976	-0.46
20	2.805	5179.9993	-0.14	5179.9964	-0.69	5180.0013	0.25	5179.998	-0.39

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

9.7. Radiated Spurious Emission

Requirements

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

Frequency(MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

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Limits of unwanted emission out of the restricted bands

Applicable To		Limit	
789033 D02 General UNII Test Procedure New Rules v02r01		Field Strength at 3m	
		PK:74 (dBμV/m)	AV:54 (dBμV/m)
Frequency Band	Applicable To	EIRP Limit	Equivalent Field Strength at 3m
5150~5250 MHz	15.407(b)(1)	PK:-27 (dBm/MHz)	PK:68.2(dBμV/m)
5250~5350 MHz	15.407(b)(2)		
5470~5725 MHz	15.407(b)(3)		
5725~5850 MHz	15.407(b)(4)(i)	PK:-27 (dBm/MHz) ^{*1} PK:10 (dBm/MHz) ^{*2} PK:15.6 (dBm/MHz) ^{*3} PK:27 (dBm/MHz) ^{*4}	PK: 68.2(dBμV/m) ^{*1} PK:105.2 (dBμV/m) ^{*2} PK: 110.8(dBμV/m) ^{*3} PK:122.2 (dBμV/m) ^{*4}
	^{*1} beyond 75 MHz or more above of the band edge. ^{*2} below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above. ^{*3} below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above. ^{*4} from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.		
5850~5895 MHz	RSS-247 clause 6.2.5.3	5725 MHz and below: PK:27 (dBm/MHz) ^{*1} PK:15.6 (dBm/MHz) ^{*2} PK:10 (dBm/MHz) ^{*3} PK:-27 (dBm/MHz) ^{*4} 5895 MHz and above: AV:-27 (dBm/MHz) ^{*a} AV:15&-7 (dBm/MHz) ^{*b} AV:-5&-27 (dBm/MHz) ^{*c}	5725 MHz and below: PK:122.2 (dBμV/m) ^{*1} PK:110.8 (dBμV/m) ^{*2} PK:105.2 (dBμV/m) ^{*3} PK:68.2 (dBμV/m) ^{*4} 5895 MHz and above: AV: 68.2 (dBμV/m) ^{*a} AV:110.2&88.2 (dBμV/m) ^{*b} AV:90.2&68.2 (dBμV/m) ^{*c}
		^{*1} 5 MHz below the 5725 MHz band edge. ^{*2} 5 MHz below the 5725 MHz band edge decreasing linearly to 10 dBm/MHz at 25 MHz below ^{*3} 25 MHz below the 5725 MHz band edge decreasing linearly to -27 dBm/MHz at 75 MHz below ^{*4} More than 75 MHz below the 5725 MHz band edge. ^{*a} Fixed outdoor access points and fixed outdoor client devices shall not exceed -27 dBm/MHz e.i.r.p. spectral density at or above the 5895 MHz band edge. ^{*b} Indoor access points or indoor subordinate devices shall not exceed 15 dBm/MHz e.i.r.p. spectral density at the 5895 MHz band edge and shall decrease linearly to not exceed -7 dBm/MHz e.i.r.p. spectral density at or above 5925 MHz. ^{*c} Client devices shall not exceed -5 dBm/MHz e.i.r.p. spectral density at the 5895 MHz band edge and shall decrease linearly to not exceed -27 dBm/MHz e.i.r.p. spectral density at or above 5925 MHz.	

Note:

The following formula is used to convert the effective isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts).}$$

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

Test Procedures

[For 9 kHz ~ 30 MHz]

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. For measurement below 30MHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

[For above 30 MHz]

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
- f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

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