

RADIO TEST REPORT

Product : AUGi Gem

Model Name : IN6A008

FCC ID : 2BNIV-GEM-1

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

Received Date : 2025/3/10

Test Date : 2025/3/11 ~ 2025/3/28

Issued Date : 2025/5/12

Applicant : All Inspire Health
19 Morris Avenue, Building 128, Brooklyn, NY 11205

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

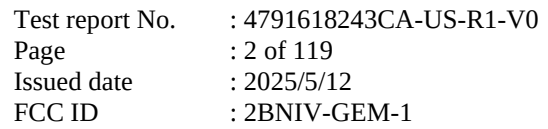


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Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Telephone : +886-2-7737-3000
Facsimile (FAX) : +886-3-583-7948

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



Original Test Report No.: 4791618243CA-US-R1-V0

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Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Telephone :+886-2-7737-3000
Facsimile (FAX) :+886-3-583-7948 Doc No: Form-ULID-004739 (DCS

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1. Attestation of Test Results

APPLICANT: All Inspire Health
19 Morris Avenue, Building 128, Brooklyn, NY 11205

MANUFACTURER: InnoComm Mobile Technology Corporation
3F, No. 6, Hsin Ann Rd., Hsinchu Science Park, Hsinchu 300092,
Taiwan

EUT DESCRIPTION: AUGi Gem

BRAND: All Inspire Health

MODEL: IN6A008

SAMPLE STAGE: Engineering Verification Test Sample

DATE of TESTED: 2025/3/11 ~ 2025/3/28

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:


Cindy Hsin
Project Handler

Date : 2025/5/12

Approved and Authorized By:


Eric Lee
Senior Laboratory Engineer

Date : 2025/5/12

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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.: 4791618243CA-US-R2-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

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6. Equipment under Test

6.1. Description of EUT

Product	AUGi Gem
Brand Name	All Inspire Health
Model Name	IN6A008
Normal Voltage	12Vdc from AC Adapter 3.2Vdc from Battery

Operating Frequency	5180 ~ 5240MHz, 5260 ~ 5320MHz, 5500 ~ 5700MHz, 5745 ~ 5825MHz
Modulation	1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
Transfer Rate	802.11a: up to 54 Mbps
	802.11n: up to MCS15
	802.11ac: up to MCS9
	802.11ax: up to MCS11
Maximum Output Power	5180 ~ 5240 MHz: 17.27 dBm
	5260 ~ 5320 MHz: 17.12 dBm
	5500 ~ 5700 MHz: 17.98 dBm
	5745 ~ 5825 MHz: 17.55 dBm
Sample ID	Conducted Test:7980205
	Radiated Test:7980206

Note:

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

Modulation Mode	Tx Function	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
802.11ax(HE20)	2Tx	2Rx
802.11ax(HE40)	2Tx	2Rx
802.11ax(HE80)	2Tx	2Rx

*The modulation and bandwidth are similar for 802.11n mode, 802.11ac mode, for 20MHz, 40MHz, 80MHz, bandwidth system, therefore investigated one worst case to representative mode in test report.

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2. The EUT contains following accessory devices:

Product	Brand	Model	Description
AC Adapter	FranMar	FHA036-S120-U	Input: 100-240Vac, 50/60Hz, 1A Output: 12Vdc, 3A, 36W
AC Adapter	Xingde	TR368007	Input: 100-240Vac, 50/60Hz, 1A Output: USB-C: 5Vdc, 3A, 9Vdc, 3A, 12Vdc, 3A, 15Vdc, 2.4A, 20Vdc, 1.8A (36W Max) USB-A: 3.6-6Vdc, 3A, 6-9Vdc, 2A, 9-12Vdc, 1.5A (18W Max) USB-C+USB-A: 5Vdc, 3A, 15W
Battery	UTL	IFR14500	3.2Vdc, 1.92Wh, 600mAh

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.
4. The EUT contains three modules, namely module 1 (BT+WLAN 2.4GHz+WLAN 5GHz), module 2 (BLE), and module 3 (LoRa). This test report is the WLAN 5GHz test result of module 1 (BT+WLAN 2.4GHz+WLAN 5GHz).

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

FOR 5500 ~ 5700MHz

11 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	-	-
116	5580	-	-
120	5600	-	-
124	5620	-	-
128	5640	-	-

5 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	-	-

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

Channel	Frequency (MHz)	Channel	Frequency (MHz)
106	5530	122	5610

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

6.3. Test Condition

Test Item	Test Site No.	Environmental	Input Power	Test Date	Tested by
Antenna Port Conducted Measurement	SR4	22~26°C/ 62~68%RH	12Vdc	2025/03/19~ 2025/03/21	Eric Peng
Radiated Spurious Emission	966-2	22~26°C/ 62~68%RH	12Vdc	2025/03/11~ 2025/03/19	Eric Peng
AC power Line Conducted Emission	SR1	23°C/ 65%RH	120Vac/ 60Hz	2025/03/28	Eric Peng

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	Frequency Range	Brand Name	Model Name	Maximum Gain (dBi)	Ant. Type
WIFI 1	Chain0	2402~2480MHz	AWAN	Vision_WLAN	2.29	Dipole
WIFI 1	Chain0	4910~5850MHz	AWAN	Vision_WLAN	2.51	Dipole
WIFI 2	Chain1	2402~2480MHz	AWAN	Vision_WLAN	2.2	Dipole
WIFI 2	Chain1	4910~5850MHz	AWAN	Vision_WLAN	2.39	Dipole

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	Frequency Range(MHz)	Modulation Type	Available Channel	Test Channel	Data Rate
Radiated Bandedge	802.11a	5180-5240	OFDM	36 to 48	36, 44, 48	6 Mbps
	802.11ax (HE20)			36 to 48	36, 44, 48	MCS0 Nss1
	802.11ax (HE40)			38 to 46	38, 46	MCS0 Nss1
	802.11ax (HE80)			42	42	MCS0 Nss1
	802.11a	5260-5320	OFDM	52 to 64	52, 60, 64	6 Mbps
	802.11ax (HE20)			52 to 64	52, 60, 64	MCS0 Nss1
	802.11ax (HE40)			54 to 62	54, 62	MCS0 Nss1
	802.11ax (HE80)			58	58	MCS0 Nss1
	802.11a	5500-5700	OFDM	100 to 140	100, 116, 140	6 Mbps
	802.11ax (HE20)			100 to 140	100, 116, 140	MCS0 Nss1
	802.11ax (HE40)			102 to 134	102, 110, 134	MCS0 Nss1
	802.11ax (HE80)			106 to 122	106, 122	MCS0 Nss1
	802.11a	5745-5825	OFDM	149 to 165	149, 157, 165	6 Mbps
	802.11ax (HE20)			149 to 165	149, 157, 165	MCS0 Nss1
	802.11ax (HE40)			151 to 159	151, 159	MCS0 Nss1
	802.11ax (HE80)			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	5500-5700		100 to 140	100, 116, 140	6 Mbps
	802.11a	5745-5825		149 to 165	149, 157, 165	6 Mbps
Radiated Emissions (Below 1GHz)	802.11a	5180-5240	OFDM	36 to 48	48	6 Mbps
AC Power Line Conducted Emission	802.11a	5500-5700	OFDM	100 to 140	116	6 Mbps

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Test Item	Mode	Frequency Range(MHz)	Modulation Type	Available Channel	Test Channel	Data Rate
Antenna Port Conducted Measurement	802.11ax (HE20)	5180-5240	OFDM	36 to 48	36, 44, 48	MCS0 Nss1
	802.11ax (HE40)			38 to 46	38, 46	MCS0 Nss1
	802.11ax (HE80)			42	42	MCS0 Nss1
	802.11a	5260-5320	OFDM	52 to 64	52, 60, 64	6 Mbps
	802.11ax (HE20)			52 to 64	52, 60, 64	MCS0 Nss1
	802.11ax (HE40)			54 to 62	54, 62	MCS0 Nss1
	802.11ax (HE80)			58	58	MCS0 Nss1
	802.11a	5500-5700	OFDM	100 to 140	100, 116, 140	6 Mbps
	802.11ax (HE20)			100 to 140	100, 116, 140	MCS0 Nss1
	802.11ax (HE40)			102 to 134	102, 110, 134	MCS0 Nss1
	802.11ax (HE80)			106 to 122	106, 122	MCS0 Nss1
	802.11a	5745-5825	OFDM	149 to 165	149, 157, 165	6 Mbps
	802.11ax (HE20)			149 to 165	149, 157, 165	MCS0 Nss1
	802.11ax (HE40)			151 to 159	151, 159	MCS0 Nss1
	802.11ax (HE80)			155	155	MCS0 Nss1

- 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.
- The Charging mode has 2 types of power source: 12Vdc from AC Adapter (Model: FHA036-S120-U) and 12Vdc from AC Adapter (Model: TR368007), above types was pre-tested radiated emission, the worst case was found in the (Model: FHA036-S120-U), and therefore only the test data was recorded in this report.
- The EUT is power by rechargeable battery. after pre-scan battery capacity at 0%, 50% and 100% , the worst case was found in the 100%. Therefore only the test data of the 100% of battery capacity was recorded in this report.
- 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, 802.11a channel 116 has the highest RF output power. Therefore, the AC conduction was performed using this worst-case mode.

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- In the transmit mode, 802.11a channel 48 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).

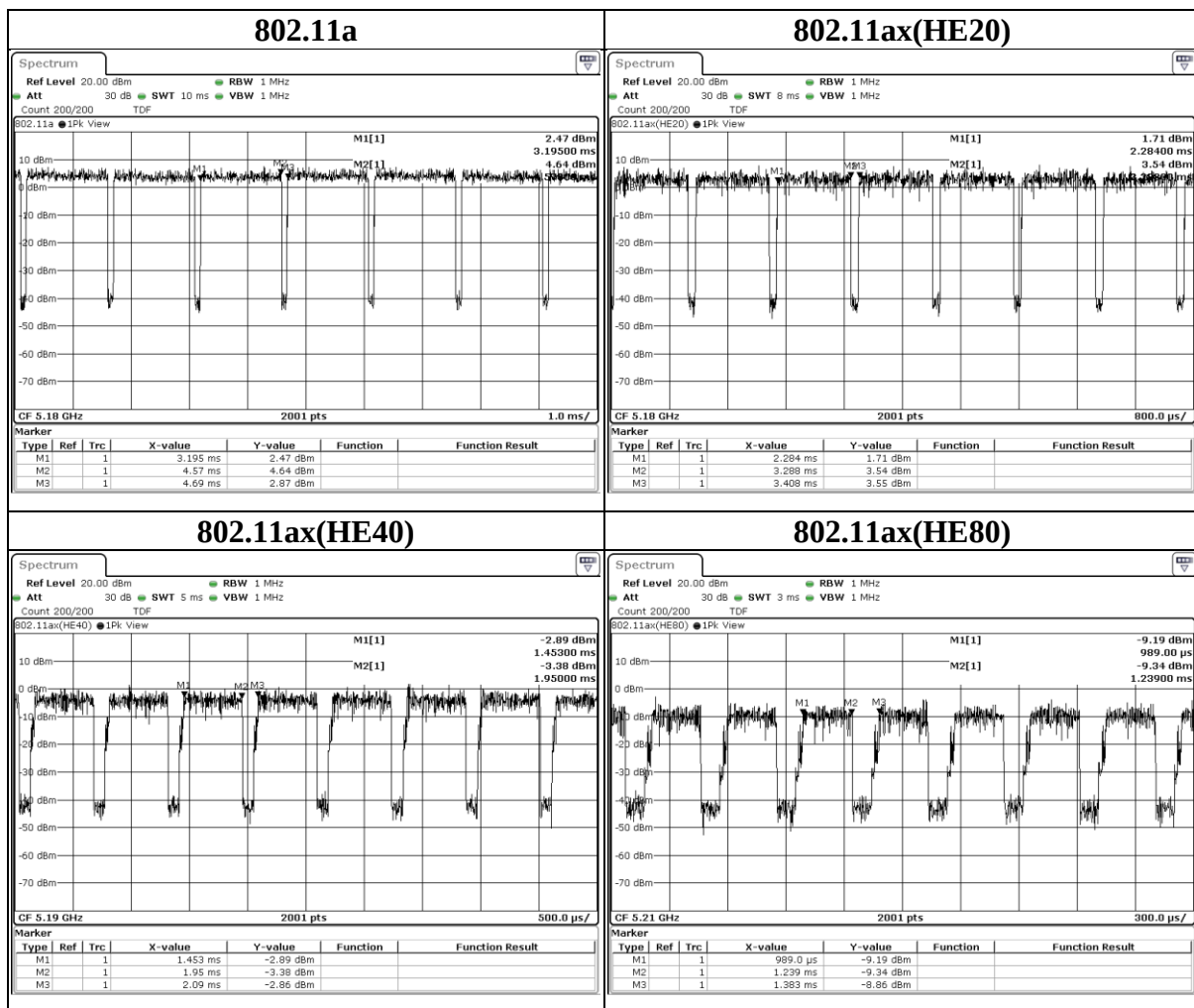
Simultaneously transmission condition:

Condition	Technology				
	Module 1			Module 2	Module 3
1	BT	WLAN (2.4GHz)	WLAN (5GHz)	BLE	LoRa

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

6.6. Duty cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle	Duty Factor (dB)	VBW Set (above 1GHz)
802.11a	1.375	1.495	0.9197	0.36	1kHz
802.11ax(HE20)	1.004	1.124	0.8932	0.49	1kHz
802.11ax(HE40)	0.497	0.637	0.7802	1.08	3kHz
802.11ax(HE80)	0.250	0.394	0.6345	1.98	5.1kHz



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	2024/12/24	2025/12/23
Loop Antenna	ETS lindgren	6502	00213440	2024/12/11	2025/12/10
Trilog-Broadband Antenna with 5dB Attenuator	Schwarzbeck & EMCI	VULB 9168 & N-6-05	774 & AT-N0538	2024/12/30	2025/12/29
Horn Antenna (1-18 GHz)	Schwarzbeck	BBHA 9120 D	01690	2024/11/27	2025/11/26
Horn Antenna (18-40 GHz)	Schwarzbeck	BBHA 9170	781	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	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	2024/11/22	2025/11/21
Cables (18-40GHz)	Hanyitek	K1K50-UP0264-K1K50-2500	170214-1 & 170214-2	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	2025/3/5	2026/3/4
Signal Analyzer	Rohde & Schwarz	FSV40	101490	2024/7/1	2025/6/30
Attenuator	EMCI	EMC-40ATK2W10	17002	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	2025/2/25	2026/2/24
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 EMC	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	Laptop	Latitude E5470	3JFKWF2	N/A	Provide by Lab
B	AC Adapter	FranMar	FHA036-S120-U	N/A	Supplied by Client
C	Battery	UTL	IFR14500	N/A	Provide by Lab 3.2Vdc

I/O Cables

ID	Equipment	Brand Name	Model Name	Length (m)	Remark
1	USB cable	N/A	N/A	0.5	Supplied by Client

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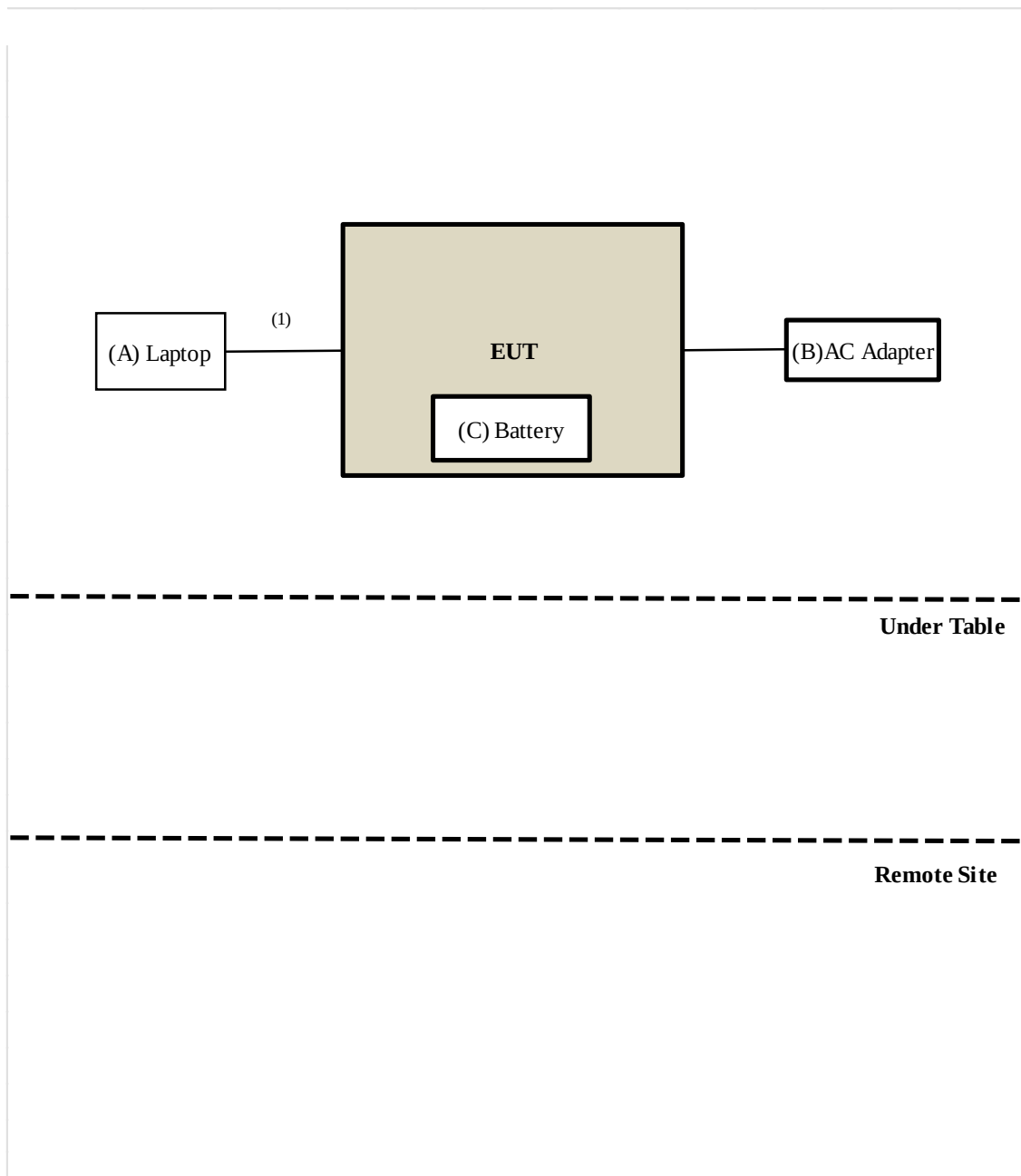
Test Setup

The EUT was worked in engineering mode to transmit signal.

Controlled using a bespoke application (ADB interface version 1.0.32) 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

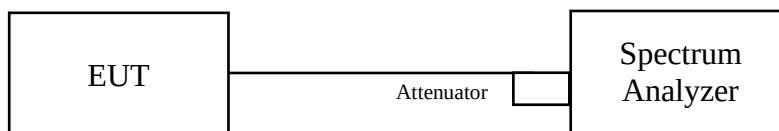
Requirements

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.

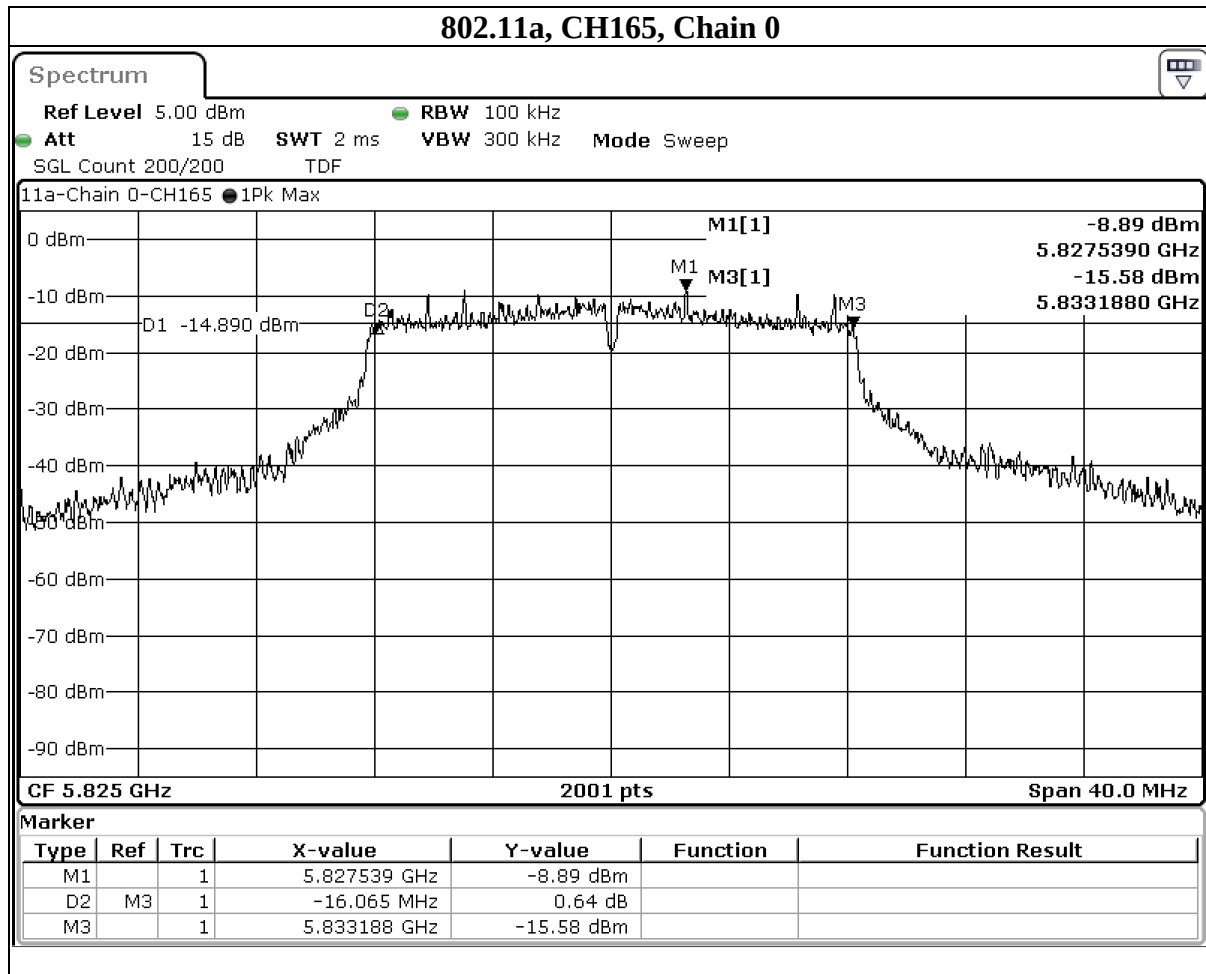
Test Setup



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	149	5745	16.325	16.314	0.5	PASS
	157	5785	16.342	16.333	0.5	PASS
	165	5825	16.065	16.323	0.5	PASS

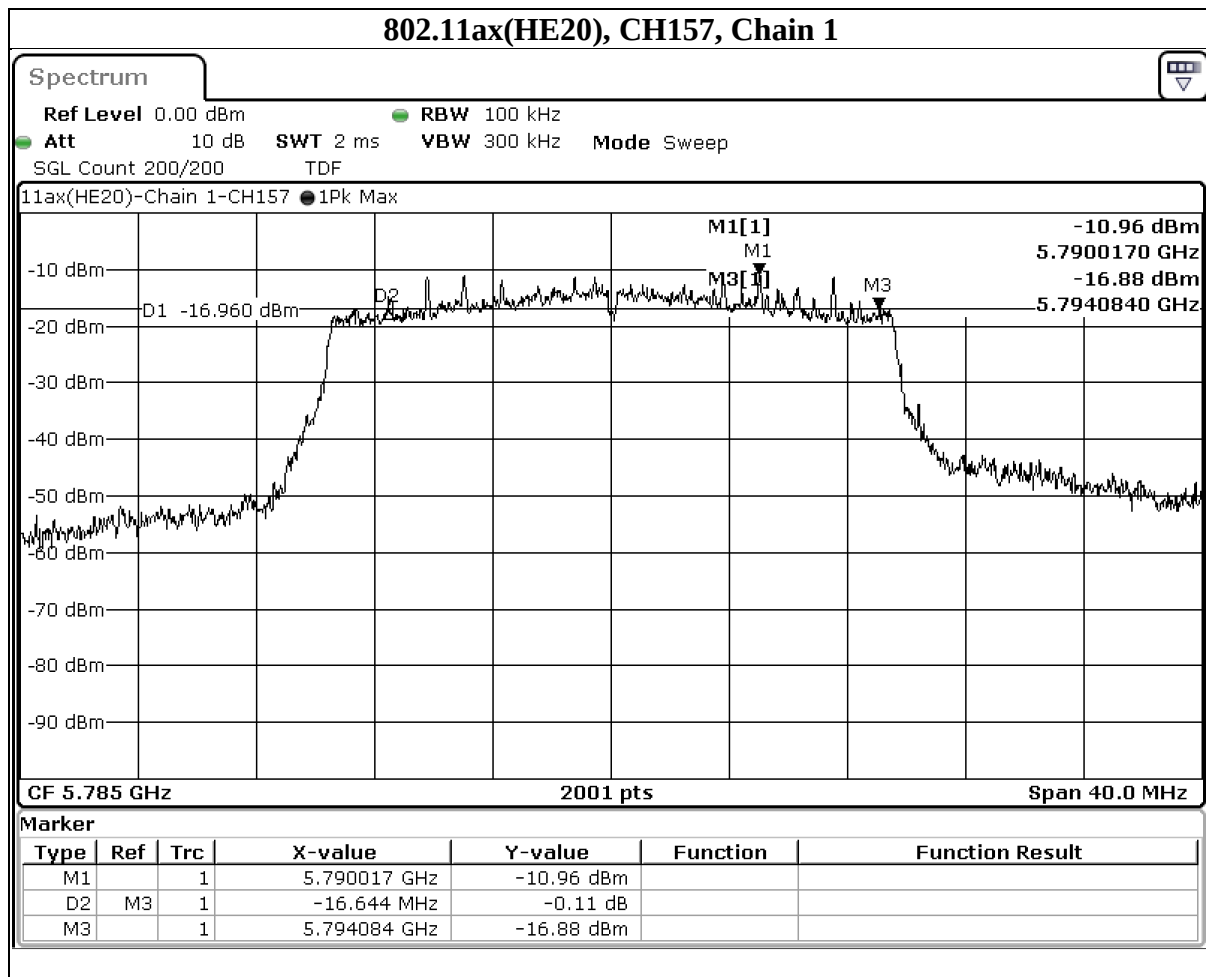


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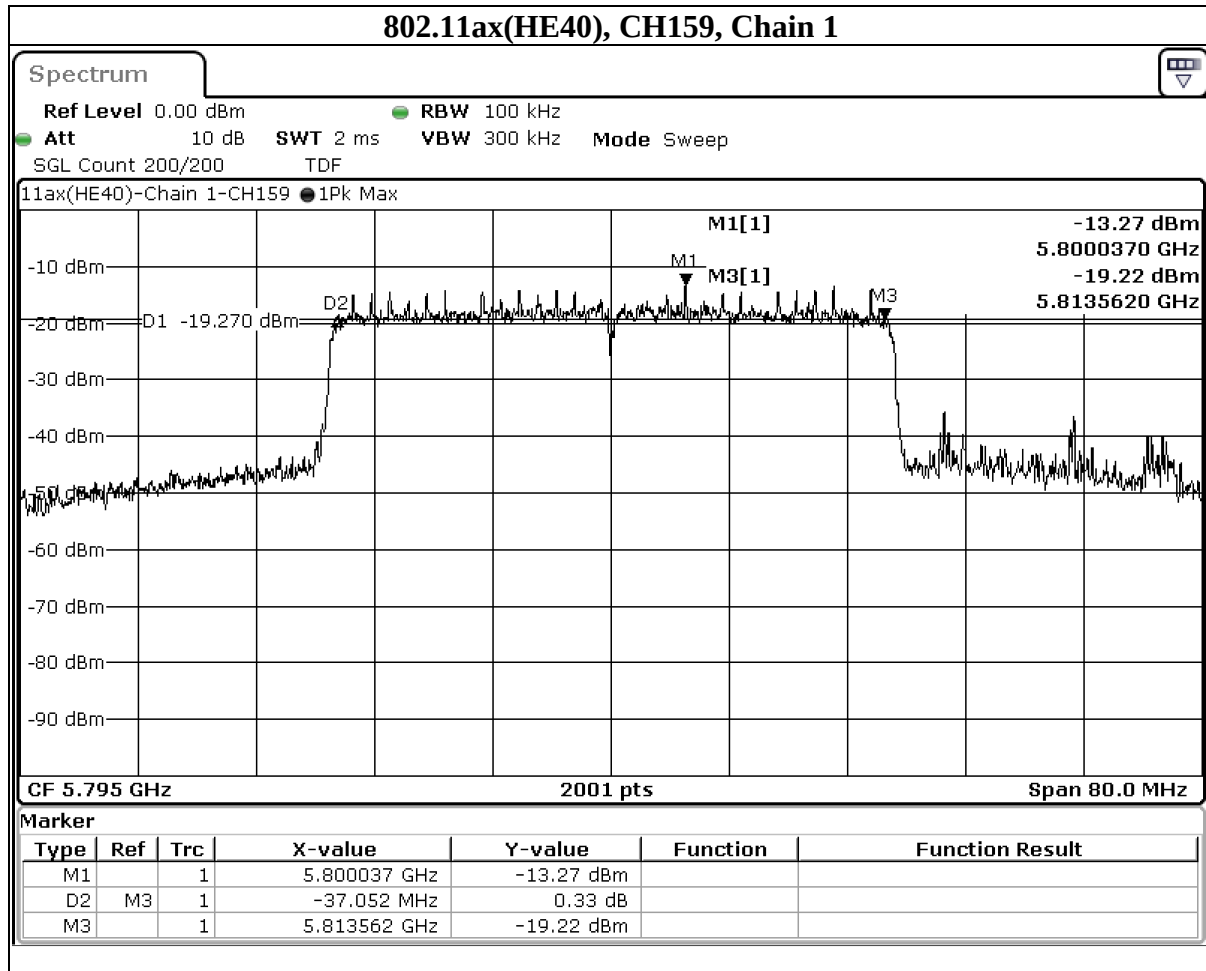
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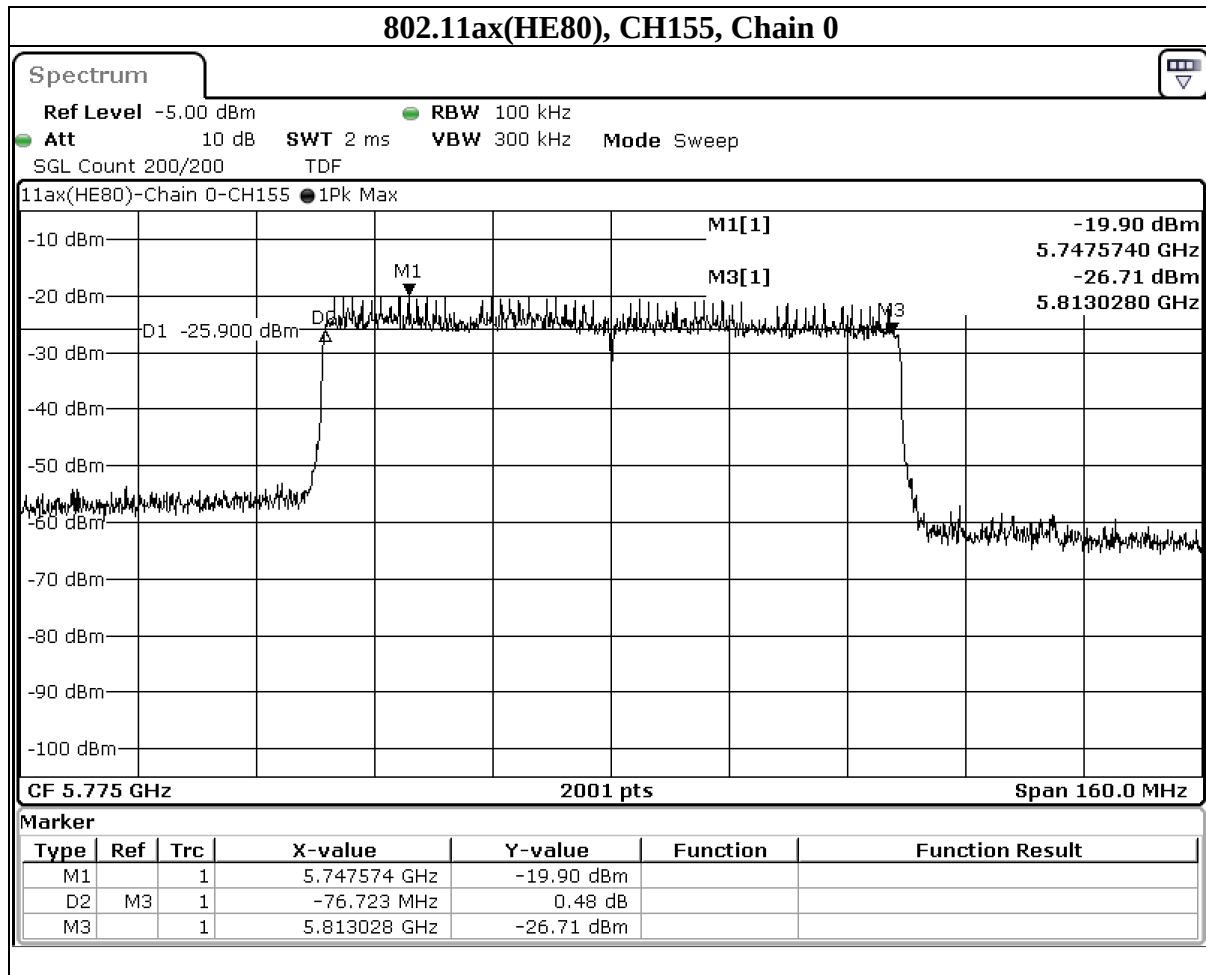
Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE20)	149	5745	18.506	17.712	0.5	PASS
	157	5785	17.963	16.644	0.5	PASS
	165	5825	18.167	16.815	0.5	PASS



Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE40)	151	5755	37.552	37.352	0.5	PASS
	159	5795	37.563	37.052	0.5	PASS



Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE80)	155	5775	76.723	77.008	0.5	PASS

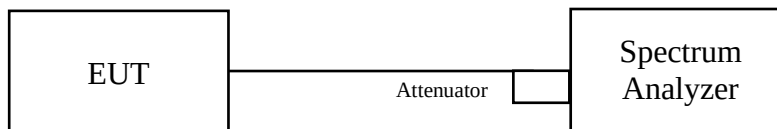


9.2. 26dB Bandwidth

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.

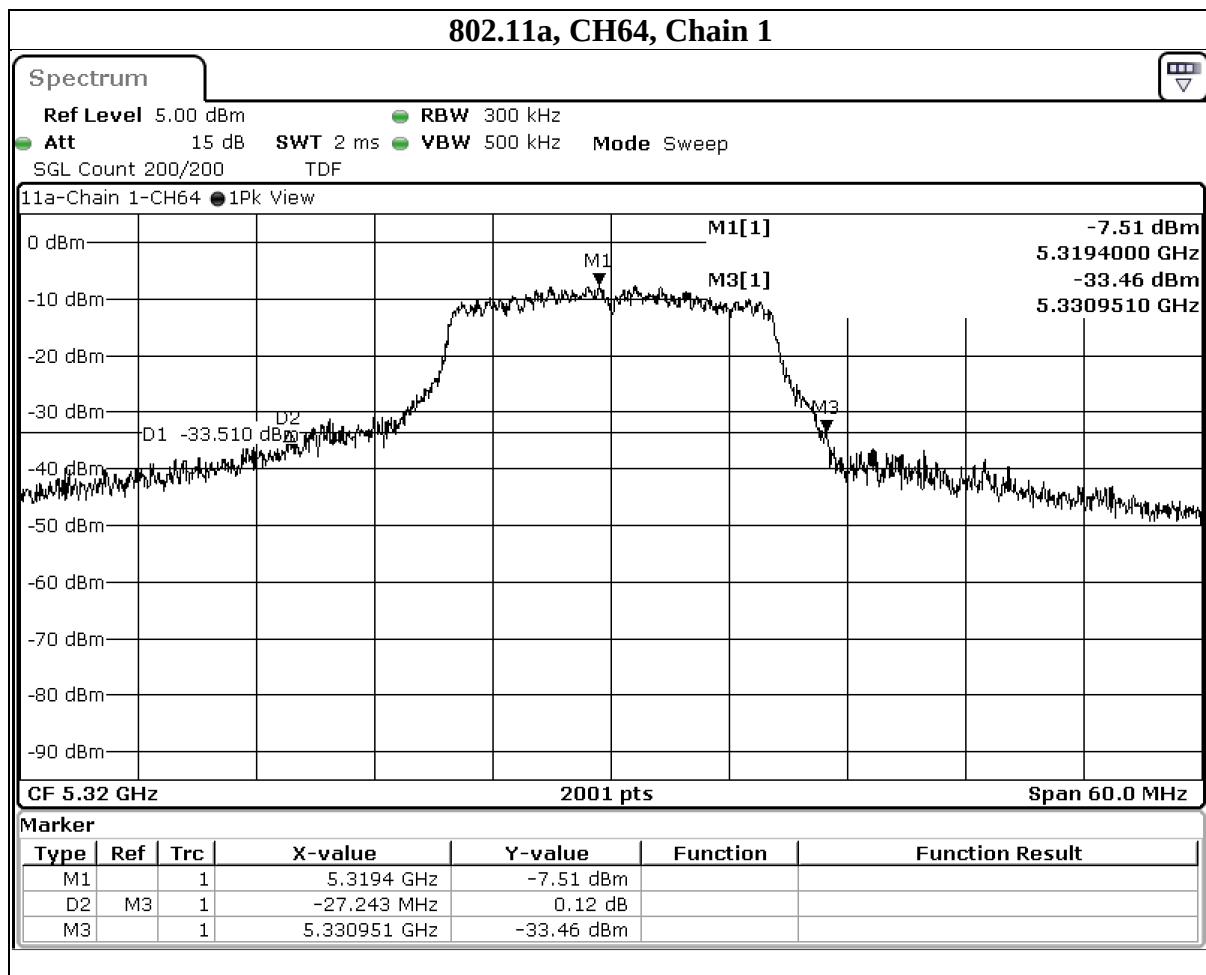
Test Setup



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	21.664	21.153	N/A	PASS
	44	5220	21.213	25.851	N/A	PASS
	48	5240	21.051	25.137	N/A	PASS
	52	5260	21.026	26.151	N/A	PASS
	60	5300	21.326	21.239	N/A	PASS
	64	5320	21.032	27.243	N/A	PASS
	100	5500	21.187	21.051	N/A	PASS
	116	5580	21.589	21.314	N/A	PASS
	140	5700	21.113	21.158	N/A	PASS



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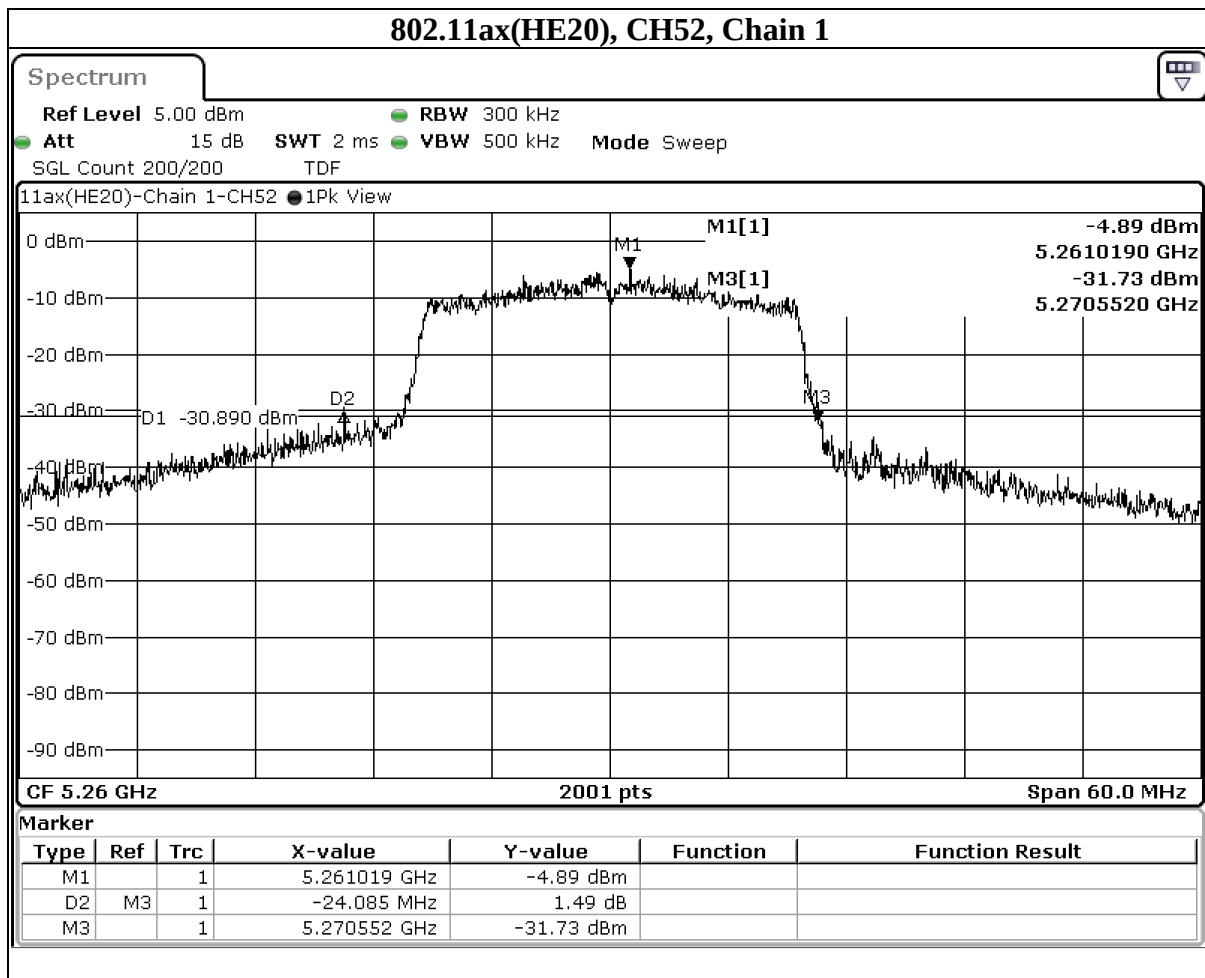
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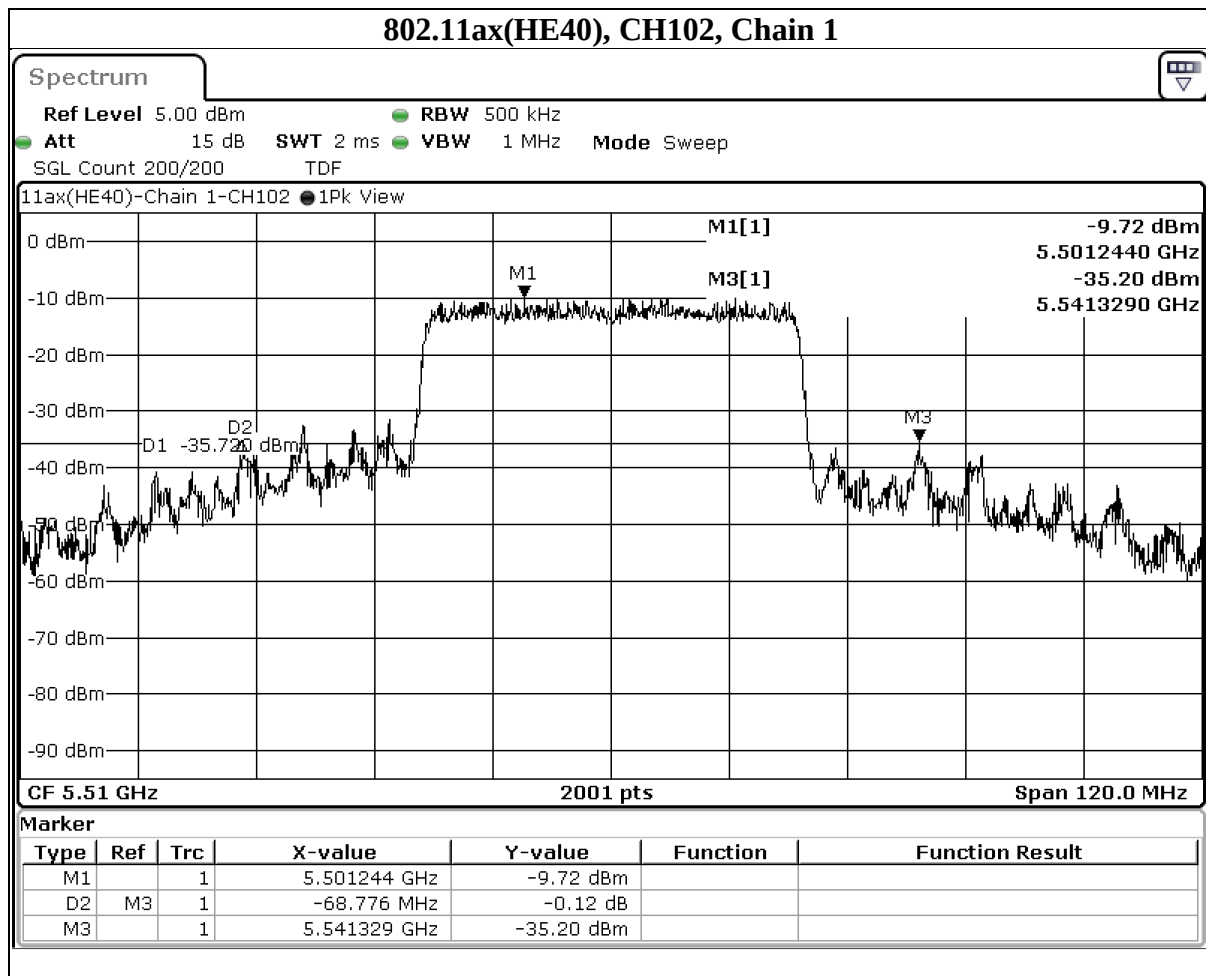
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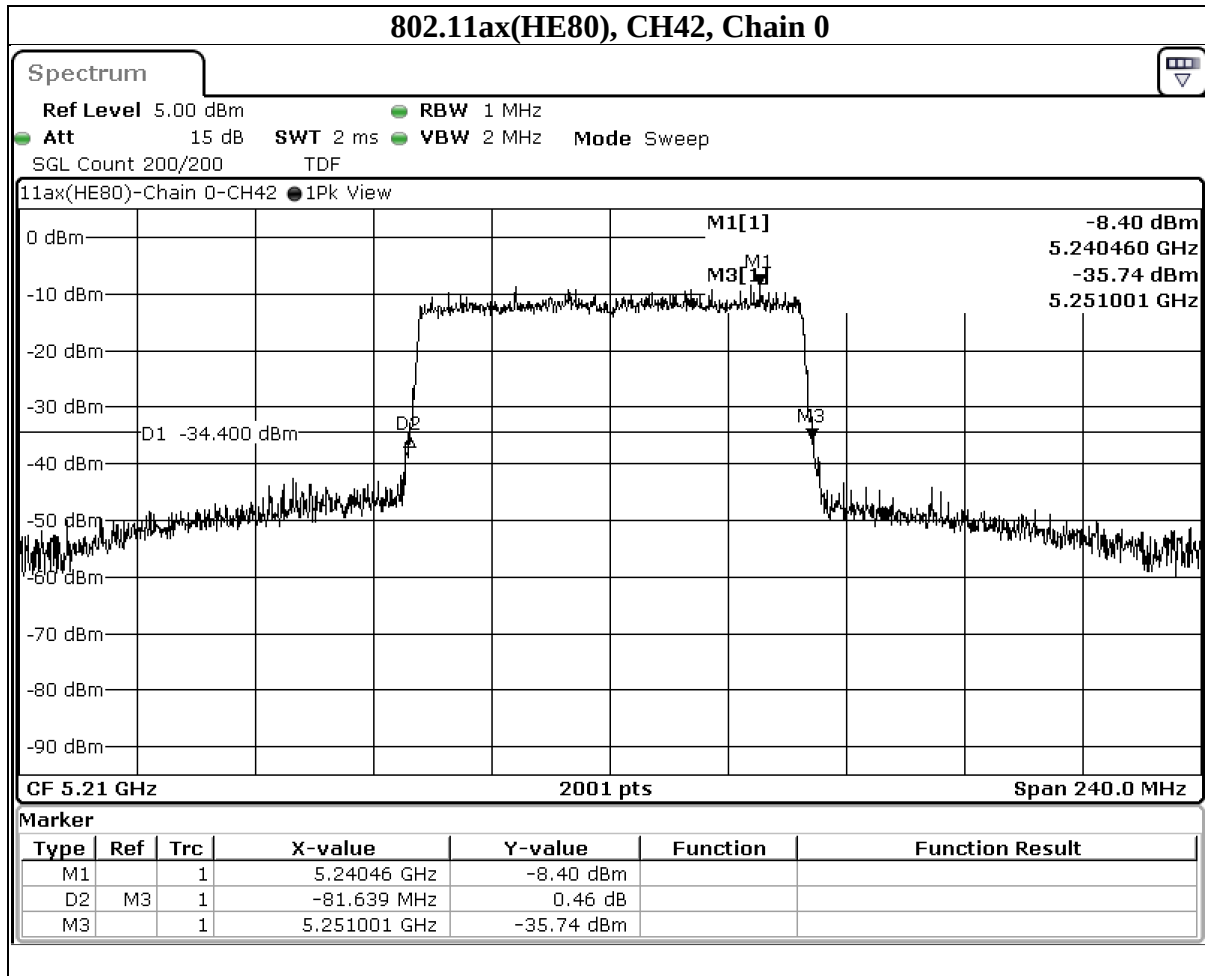
Mode	CH	Freq (MHz)	26dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE20)	36	5180	21.134	21.032	N/A	PASS
	44	5220	21.283	22.323	N/A	PASS
	48	5240	21.261	21.168	N/A	PASS
	52	5260	21.319	24.085	N/A	PASS
	60	5300	20.883	20.862	N/A	PASS
	64	5320	21.316	21.245	N/A	PASS
	100	5500	21.537	21.421	N/A	PASS
	116	5580	21.525	21.104	N/A	PASS
	140	5700	20.751	21.156	N/A	PASS



Mode	CH	Freq (MHz)	26dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE40)	38	5190	40.18	39.977	N/A	PASS
	46	5230	40.573	62.633	N/A	PASS
	54	5270	40.327	42.836	N/A	PASS
	62	5310	40.221	51.398	N/A	PASS
	102	5510	40.312	68.776	N/A	PASS
	110	5550	40.278	47.463	N/A	PASS
	134	5670	51.083	42.627	N/A	PASS



Mode	CH	Freq (MHz)	26dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE80)	42	5210	81.639	81.379	N/A	PASS
	58	5290	81.264	81.394	N/A	PASS
	106	5530	81.318	81.425	N/A	PASS
	122	5610	81.183	81.203	N/A	PASS

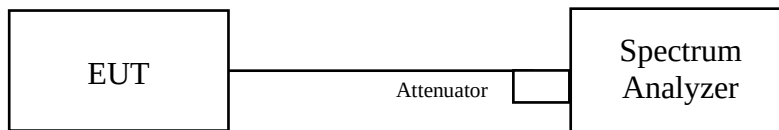


9.3. Occupied Bandwidth

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.

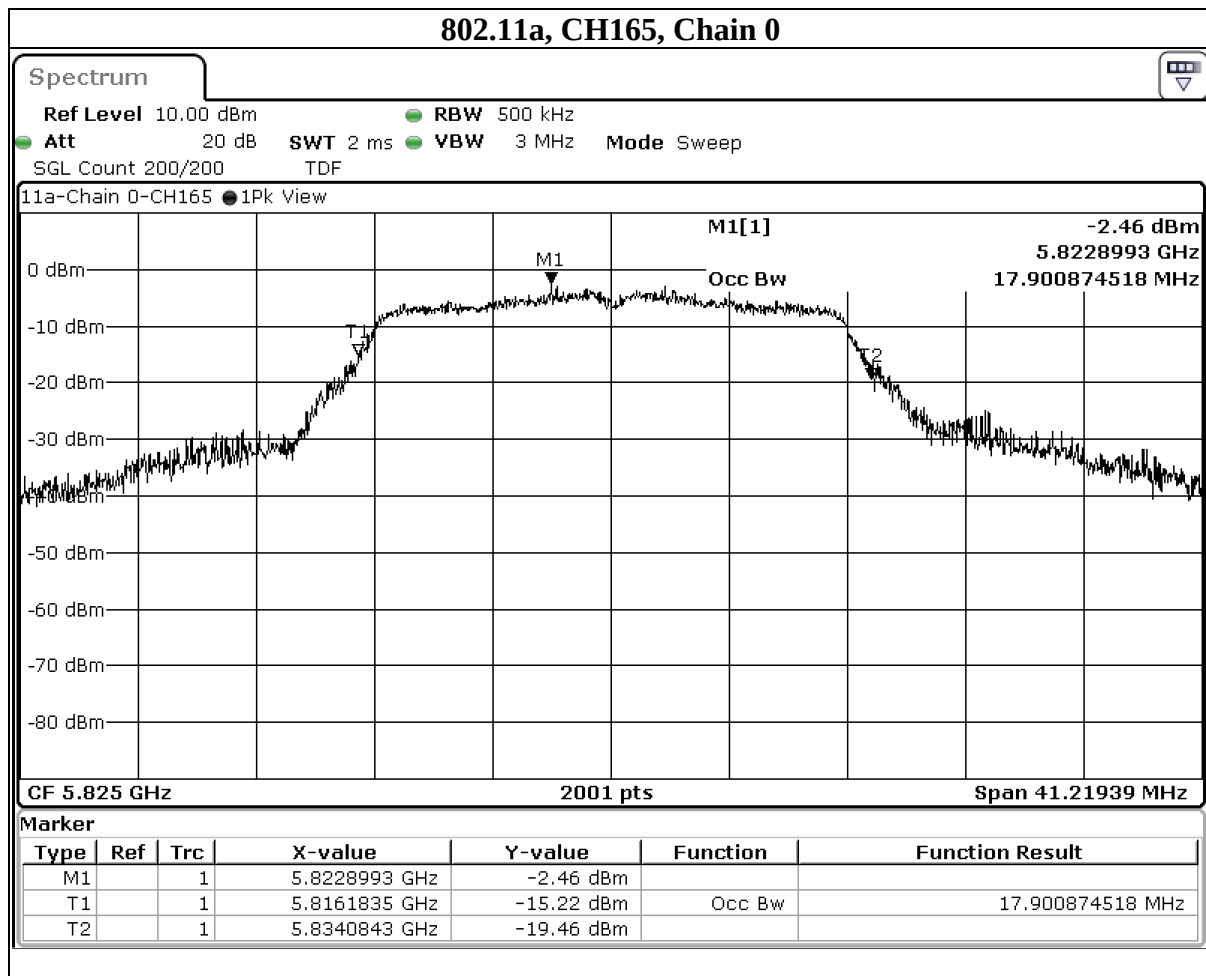
Test Setup



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	17.713	17.157	N/A	PASS
	44	5220	17.58	17.456	N/A	PASS
	48	5240	17.542	17.418	N/A	PASS
	52	5260	17.638	17.539	N/A	PASS
	60	5300	17.758	17.28	N/A	PASS
	64	5320	17.698	17.634	N/A	PASS
	100	5500	17.602	17.248	N/A	PASS
	116	5580	17.754	17.406	N/A	PASS
	140	5700	17.545	17.188	N/A	PASS
	149	5745	17.687	17.211	N/A	PASS
	157	5785	17.753	17.137	N/A	PASS
	165	5825	17.901	17.219	N/A	PASS



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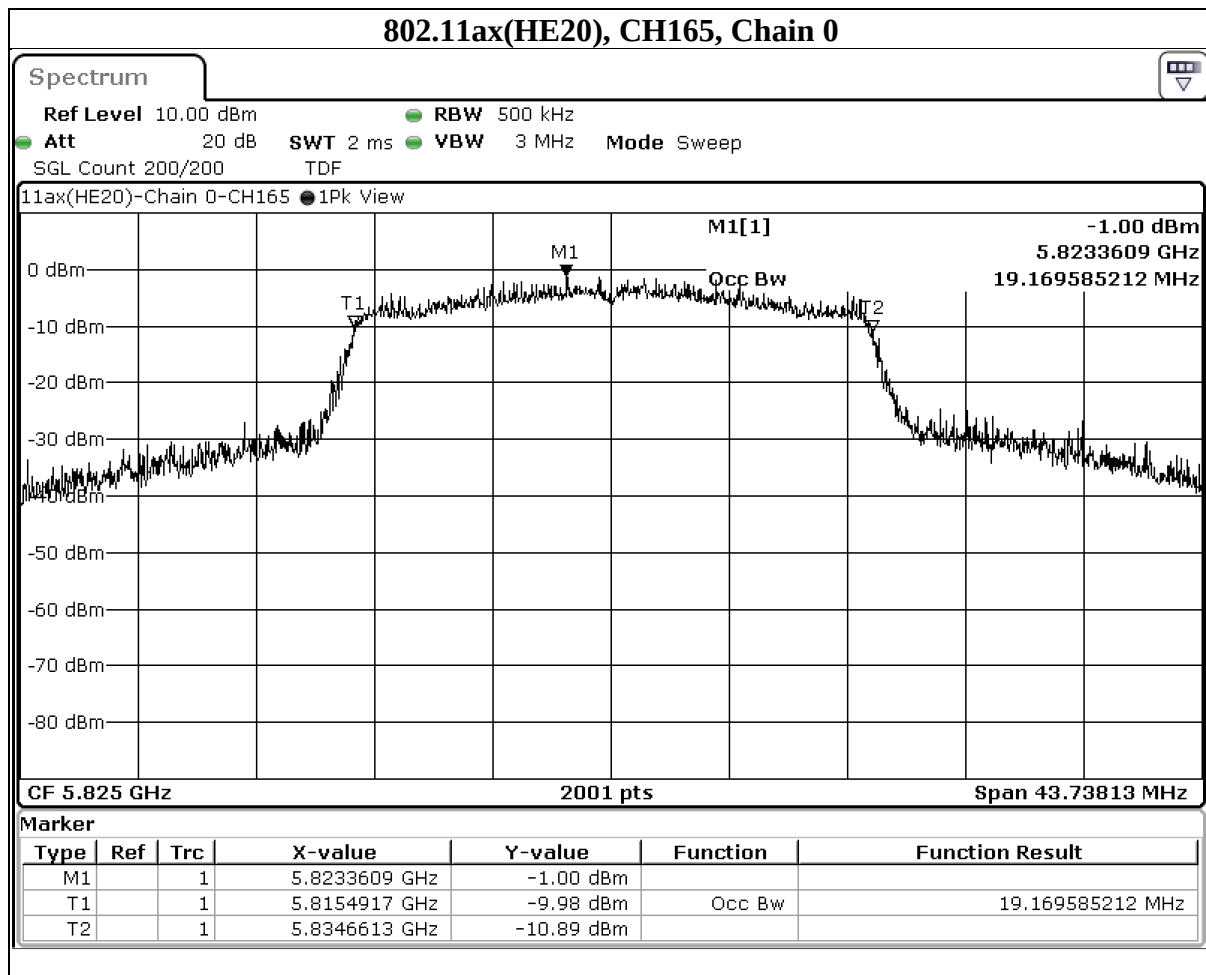
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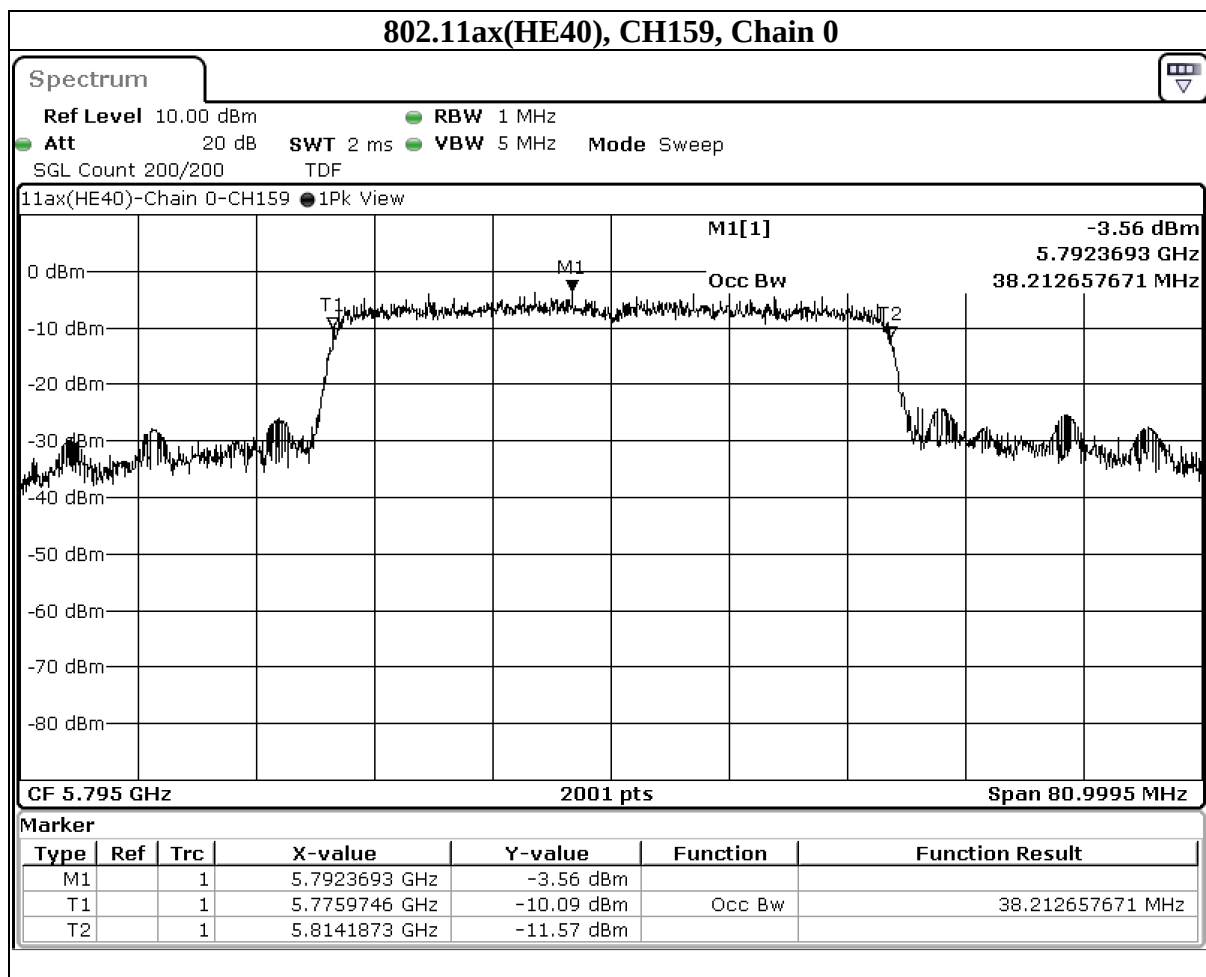
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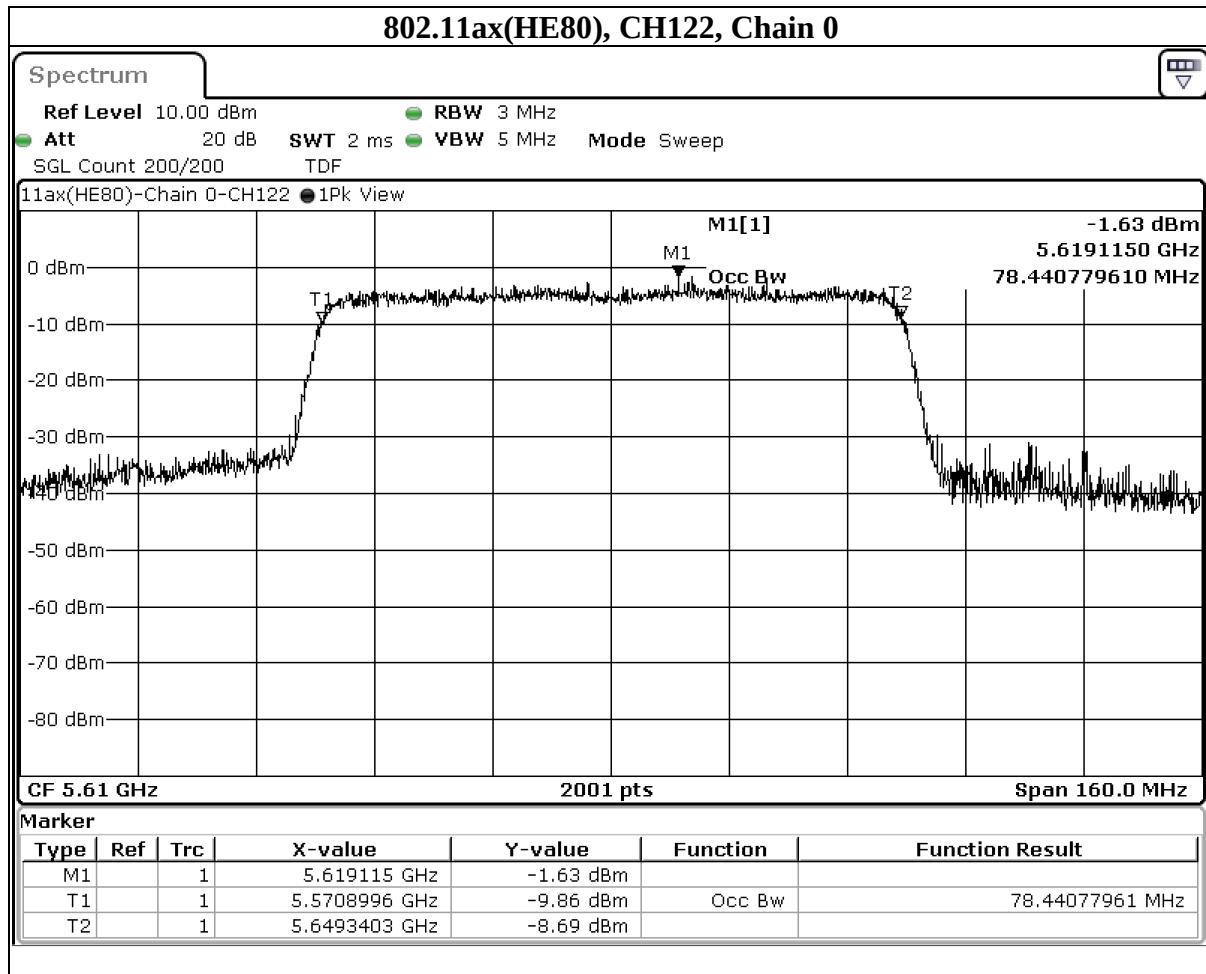
Mode	CH	Freq (MHz)	OBW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE20)	36	5180	19.055	19.041	N/A	PASS
	44	5220	19.063	19.108	N/A	PASS
	48	5240	19.063	19.148	N/A	PASS
	52	5260	19.091	19.12	N/A	PASS
	60	5300	19.051	19.126	N/A	PASS
	64	5320	19.115	19.097	N/A	PASS
	100	5500	19.073	19.105	N/A	PASS
	116	5580	19.151	19.097	N/A	PASS
	140	5700	19.084	19.088	N/A	PASS
	149	5745	19.077	19.045	N/A	PASS
	157	5785	19.099	19.037	N/A	PASS
	165	5825	19.17	19.012	N/A	PASS



Mode	CH	Freq (MHz)	OBW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE40)	38	5190	37.817	37.815	N/A	PASS
	46	5230	37.852	37.846	N/A	PASS
	54	5270	37.855	37.886	N/A	PASS
	62	5310	37.777	37.848	N/A	PASS
	102	5510	37.821	37.922	N/A	PASS
	110	5550	37.815	37.88	N/A	PASS
	134	5670	37.89	37.848	N/A	PASS
	151	5755	37.996	37.844	N/A	PASS
	159	5795	38.213	37.806	N/A	PASS



Mode	CH	Freq (MHz)	OBW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE80)	42	5210	78.361	78.201	N/A	PASS
	58	5290	78.121	78.281	N/A	PASS
	106	5530	78.201	78.201	N/A	PASS
	122	5610	78.441	78.201	N/A	PASS
	155	5775	78.441	78.361	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.

Test Procedure

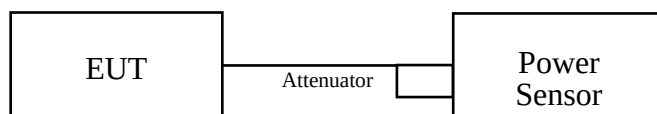
For Average Power Measurement

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

Mode	CH	Freq. (MHz)	AVG Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)	Result
802.11a	36	5180	13.57	14.79	52.845	17.23	23.98	19.74	30	Pass
	44	5220	13.74	14.72	53.333	17.27	23.98	19.78	30	Pass
	48	5240	13.54	14.56	51.168	17.09	23.98	19.6	30	Pass
	52	5260	13.59	13.67	46.132	16.64	23.9	19.15	26.99	Pass
	60	5300	14.5	13.58	50.933	17.07	23.9	19.58	26.99	Pass
	64	5320	14.51	13.56	50.933	17.07	23.9	19.58	26.99	Pass
	100	5500	15.32	13.65	57.28	17.58	23.9	20.09	26.99	Pass
	116	5580	15.71	13.95	62.087	17.93	23.9	20.44	26.99	Pass
	140	5700	15.92	13.75	62.806	17.98	23.9	20.49	26.99	Pass
	149	5745	15.03	13.58	54.702	17.38	30	19.89	36.02	Pass
	157	5785	15.18	13.53	55.463	17.44	30	19.95	36.02	Pass
802.11ax(HE20)	165	5825	15.06	13.54	54.702	17.38	30	19.89	36.02	Pass
	36	5180	13.08	13.81	44.361	16.47	23.98	18.98	30	Pass
	44	5220	13.1	13.73	44.055	16.44	23.98	18.95	30	Pass
	48	5240	13.2	13.59	43.752	16.41	23.98	18.92	30	Pass
	52	5260	13.89	13.56	47.206	16.74	23.9	19.25	26.99	Pass
	60	5300	14.47	13.71	51.523	17.12	23.9	19.63	26.99	Pass
	64	5320	14.58	13.54	51.286	17.1	23.9	19.61	26.99	Pass
	100	5500	13.45	11.79	37.239	15.71	23.9	18.22	26.99	Pass
	116	5580	15.85	13.56	61.094	17.86	23.9	20.37	26.99	Pass
	140	5700	14.22	12.09	42.56	16.29	23.9	18.8	26.99	Pass
	149	5745	15.25	13.7	56.885	17.55	30	20.06	36.02	Pass
802.11ax(HE40)	157	5785	15.03	13.71	55.335	17.43	30	19.94	36.02	Pass
	165	5825	15.28	13.51	56.105	17.49	30	20	36.02	Pass
	38	5190	12.78	12.21	35.563	15.51	23.98	18.02	30	Pass
	46	5230	13.57	13.11	43.251	16.36	23.98	18.87	30	Pass
	54	5270	13.44	13.15	42.756	16.31	23.98	18.82	26.99	Pass
	62	5310	12.76	12.45	36.475	15.62	23.98	18.13	26.99	Pass
	102	5510	12.14	11.61	30.832	14.89	23.98	17.4	26.99	Pass
	110	5550	13.55	13.18	43.451	16.38	23.98	18.89	26.99	Pass
	134	5670	14.08	12.76	44.463	16.48	23.98	18.99	26.99	Pass
802.11ax(HE80)	151	5755	14.72	13.13	50.234	17.01	30	19.52	36.02	Pass
	159	5795	14.65	13.16	49.888	16.98	30	19.49	36.02	Pass
	42	5210	11.17	11.95	28.774	14.59	23.98	17.1	30	Pass
	58	5290	11.07	11.05	25.527	14.07	23.98	16.58	26.99	Pass
	106	5530	11.33	9.72	22.961	13.61	23.98	16.12	26.99	Pass
	122	5610	13.34	10.66	33.189	15.21	23.98	17.72	26.99	Pass
	155	5775	11.83	10.57	26.669	14.26	30	16.77	36.02	Pass

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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:

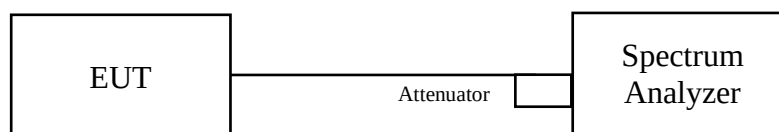
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 1 MHz, Set VBW $\geq$ 3 RBW, Detector = RMS
- Sweep time = auto, trigger set to “free run”.
- Trace average at least 100 traces in power averaging mode.
- Record the max value. (if Duty cycle <98 %, add 10 log (1/duty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

Underwriters Laboratories Taiwan Co., Ltd.

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

Telephone : +886-2-7737-3000

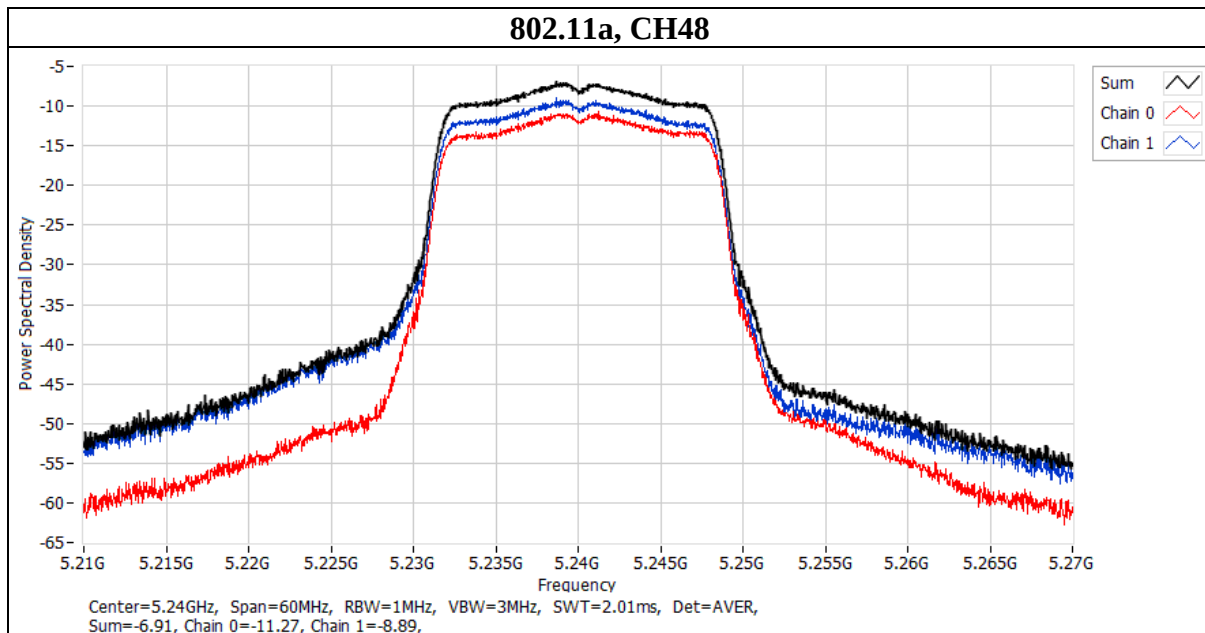
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Test Data

Mode (U-NII-1)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11a	36	5180	5.46	-7.01	11	PASS
	44	5220	5.46	-7.17	11	PASS
	48	5240	5.46	-6.91	11	PASS

Mode (U-NII-1)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11a	36	5180	-10.57	-9.37
	44	5220	-10.91	-9.4
	48	5240	-10.76	-8.89

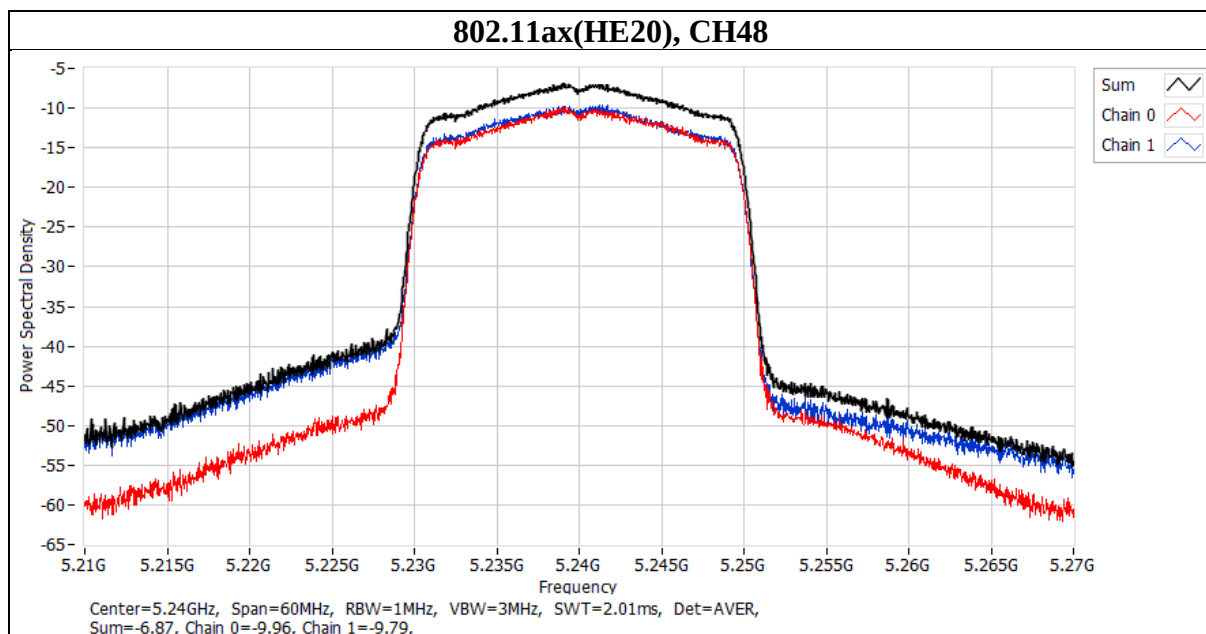


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Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Telephone : +886-2-7737-3000
Facsimile (FAX) : +886-3-583-7948

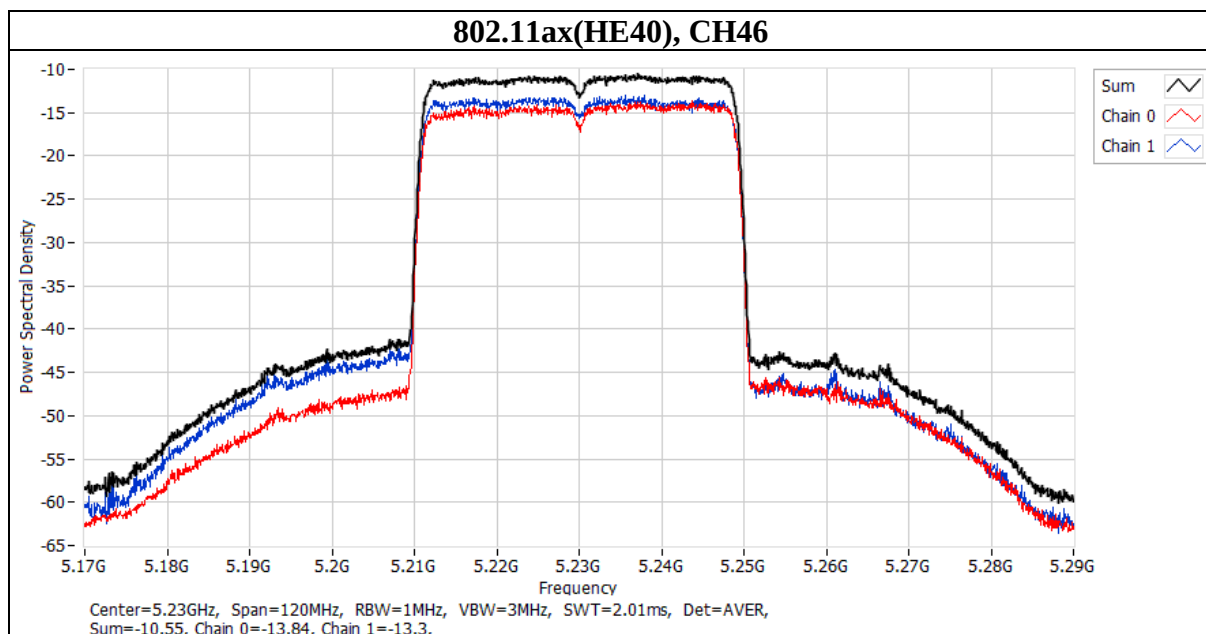
Mode (U-NII-1)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ax(HE20)	36	5180	5.46	-6.9	11	PASS
	44	5220	5.46	-6.99	11	PASS
	48	5240	5.46	-6.87	11	PASS

Mode (U-NII-1)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ax(HE20)	36	5180	-10.15	-9.47
	44	5220	-9.9	-9.52
	48	5240	-9.86	-9.68



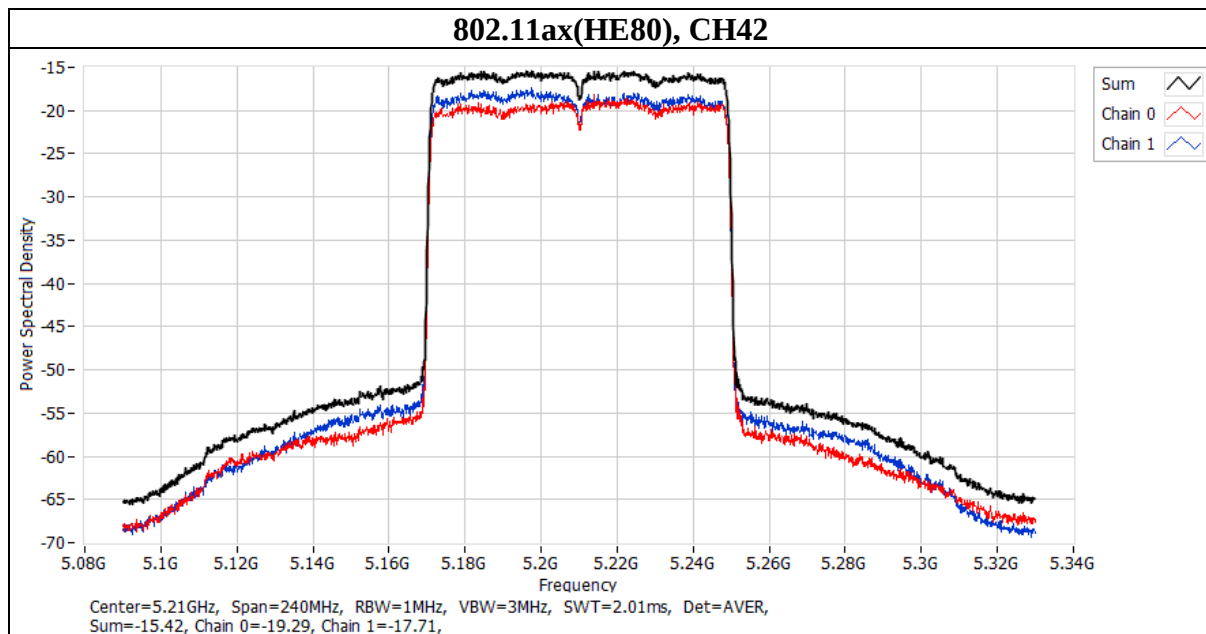
Mode (U-NII-1)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ax(HE40)	38	5190	5.46	-11.55	11	PASS
	46	5230	5.46	-10.55	11	PASS

Mode (U-NII-1)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ax(HE40)	38	5190	-14.89	-14.01
	46	5230	-13.69	-12.97



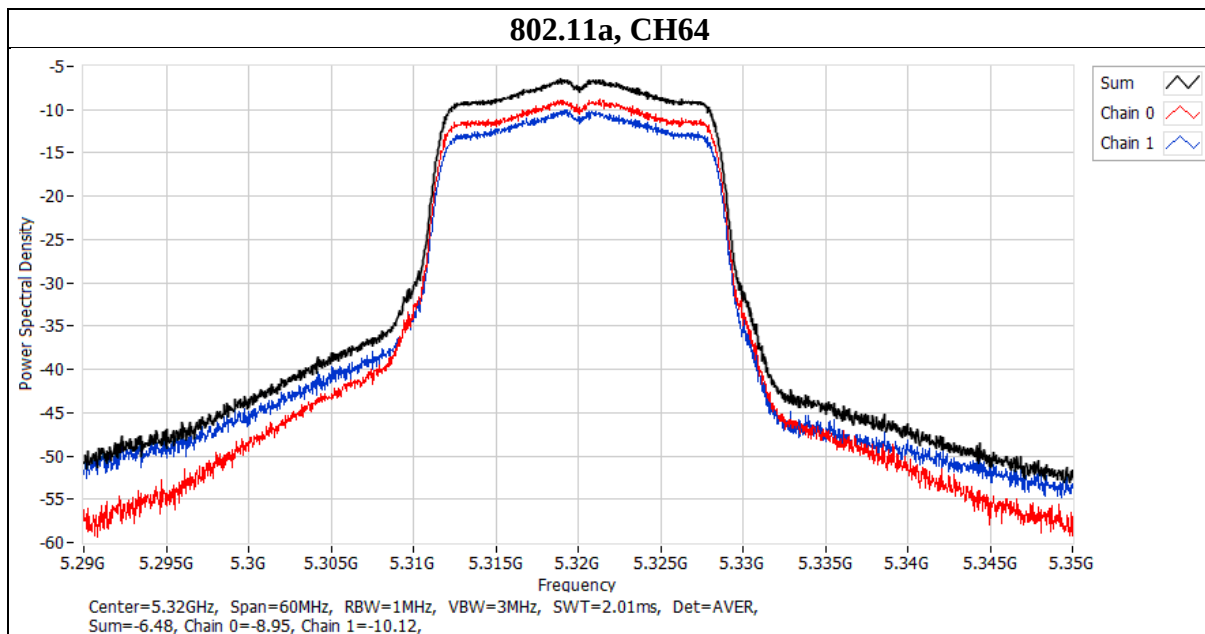
Mode (U-NII-1)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ax(HE80)	42	5210	5.46	-15.42	11	PASS

Mode (U-NII-1)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ax(HE80)	42	5210	-18.22	-17.44



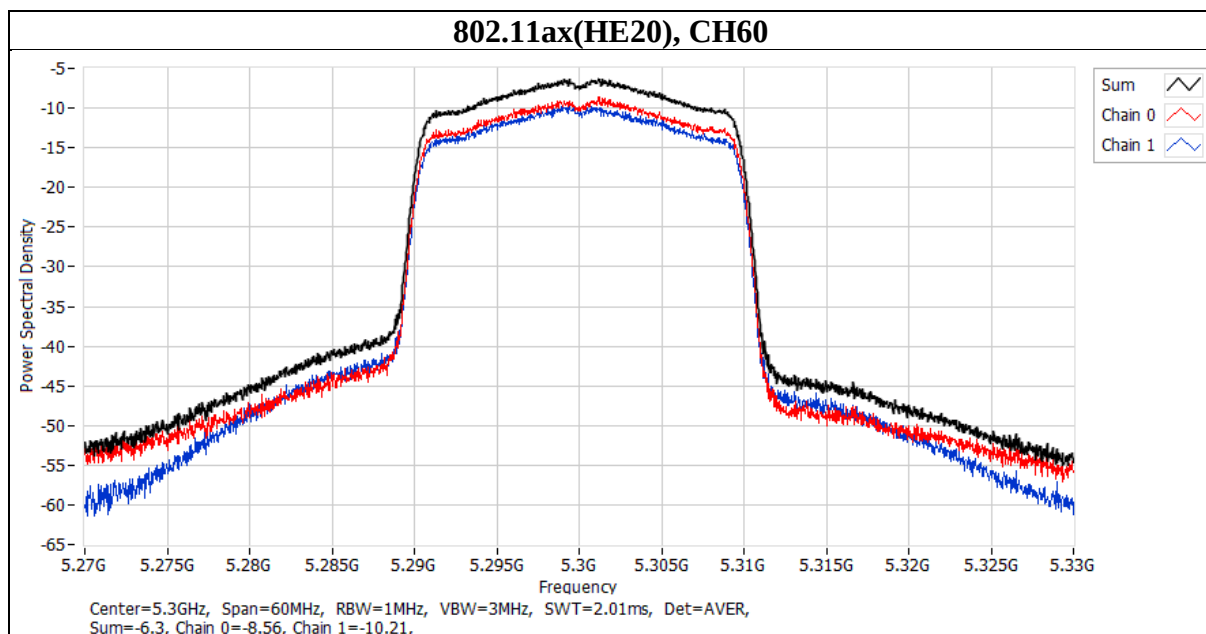
Mode (U-NII-2A)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11a	52	5260	5.46	-7.06	11	PASS
	60	5300	5.46	-7.02	11	PASS
	64	5320	5.46	-6.48	11	PASS

Mode (U-NII-2A)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11a	52	5260	-10.73	-9.08
	60	5300	-9.93	-9.86
	64	5320	-8.85	-10.1



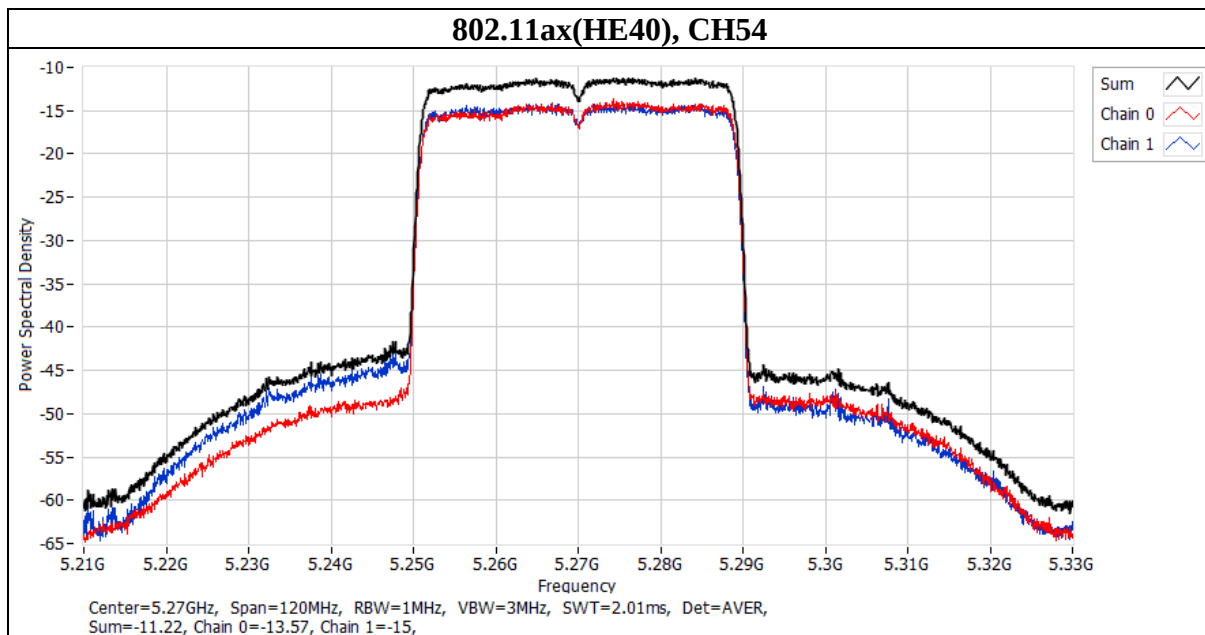
Mode (U-NII-2A)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ax(HE20)	52	5260	5.46	-6.4	11	PASS
	60	5300	5.46	-6.3	11	PASS
	64	5320	5.46	-6.3	11	PASS

Mode (U-NII-2A)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ax(HE20)	52	5260	-9.19	-9.46
	60	5300	-8.56	-9.69
	64	5320	-8.72	-9.8



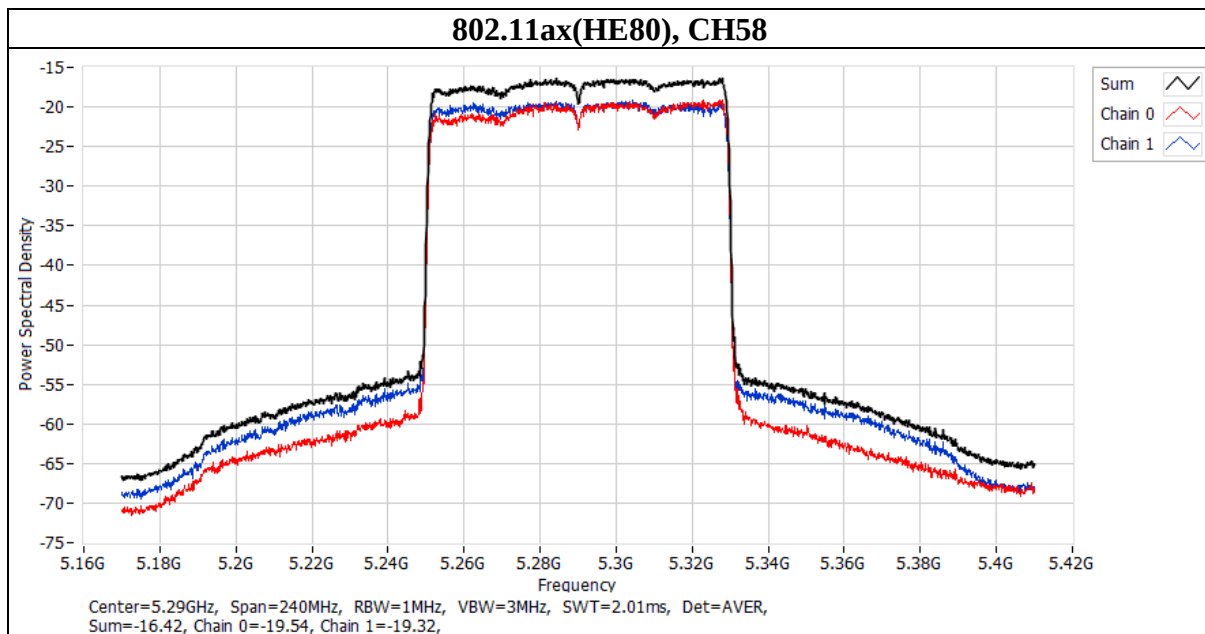
Mode (U-NII-2A)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ax(HE40)	54	5270	5.46	-11.22	11	PASS
	62	5310	5.46	-12.17	11	PASS

Mode (U-NII-2A)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ax(HE40)	54	5270	-13.57	-14.22
	62	5310	-14.64	-15.39



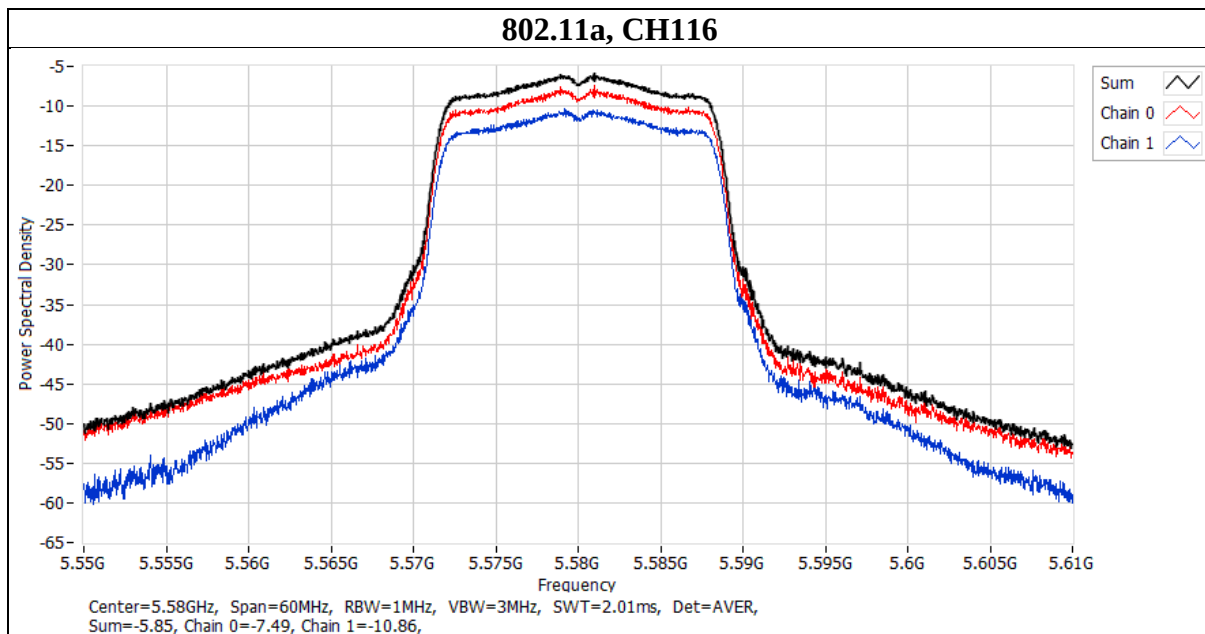
Mode (U-NII-2A)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ax(HE80)	58	5290	5.46	-16.42	11	PASS

Mode (U-NII-2A)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ax(HE80)	58	5290	-19.08	-19.2



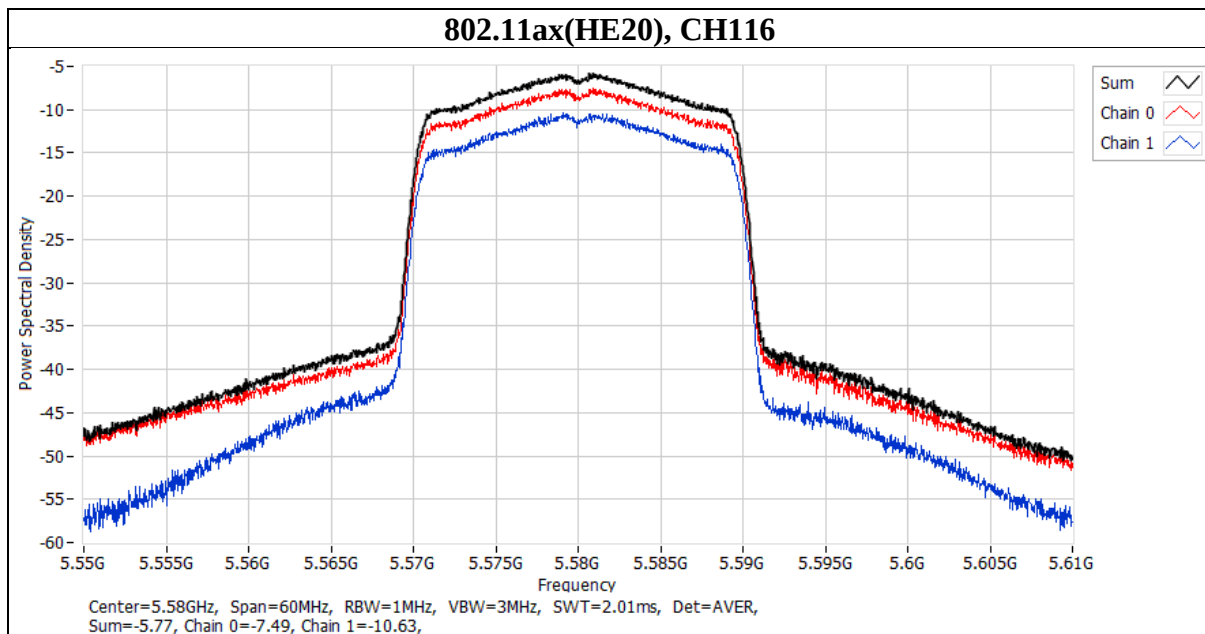
Mode (U-NII-2C)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11a	100	5500	5.46	-7.48	11	PASS
	116	5580	5.46	-5.85	11	PASS
	140	5700	5.46	-7.31	11	PASS

Mode (U-NII-2C)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11a	100	5500	-9.86	-10.92
	116	5580	-7.49	-10.25
	140	5700	-9.36	-11.28



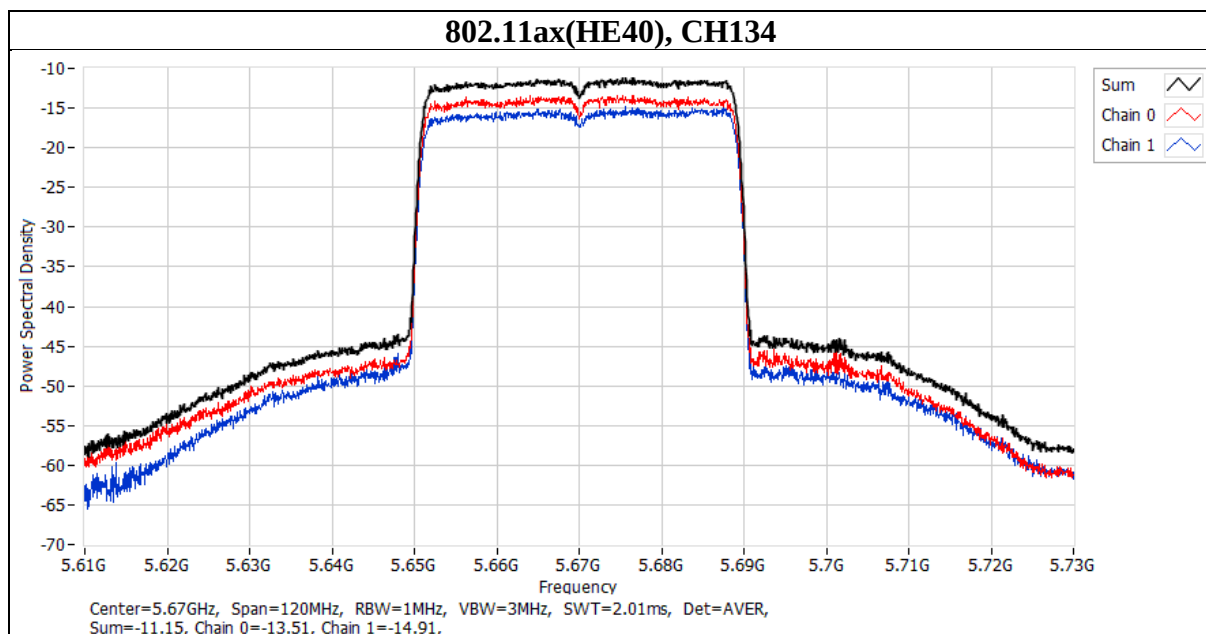
Mode (U-NII-2C)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ax(HE20)	100	5500	5.46	-7.42	11	PASS
	116	5580	5.46	-5.77	11	PASS
	140	5700	5.46	-7.54	11	PASS

Mode (U-NII-2C)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ax(HE20)	100	5500	-9.76	-10.92
	116	5580	-7.49	-10.41
	140	5700	-9.68	-11.01



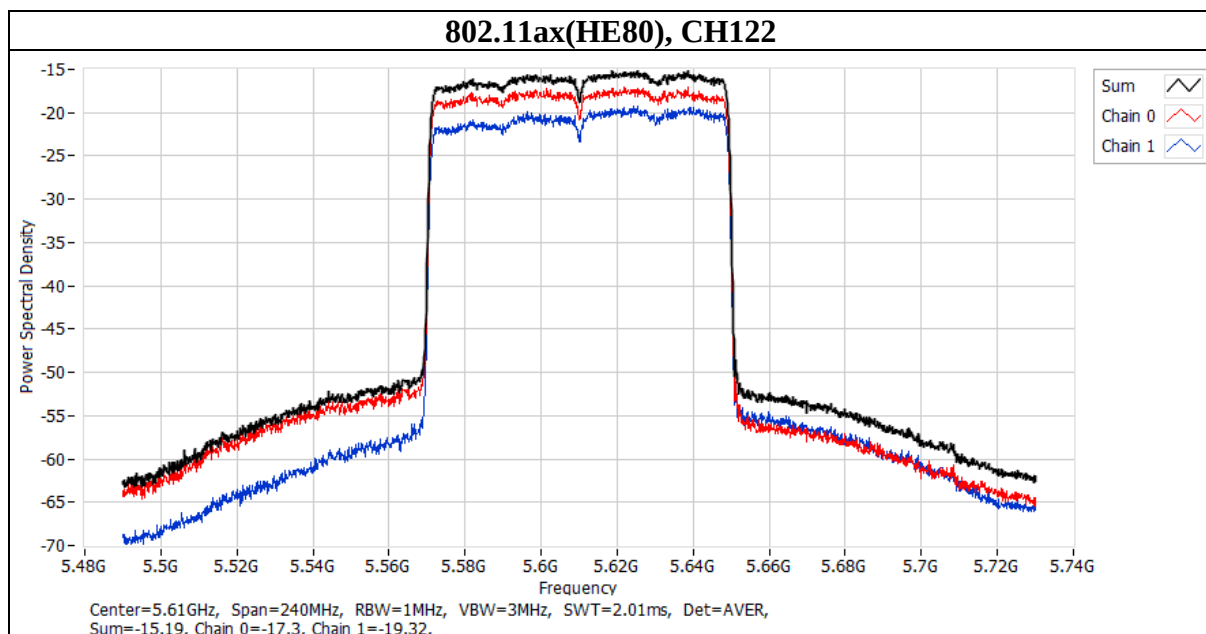
Mode (U-NII-2C)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ax(HE40)	102	5510	5.46	-13.55	11	PASS
	110	5550	5.46	-11.94	11	PASS
	134	5670	5.46	-11.15	11	PASS

Mode (U-NII-2C)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ax(HE40)	102	5510	-16.42	-16.44
	110	5550	-14.5	-14.93
	134	5670	-13.41	-14.84



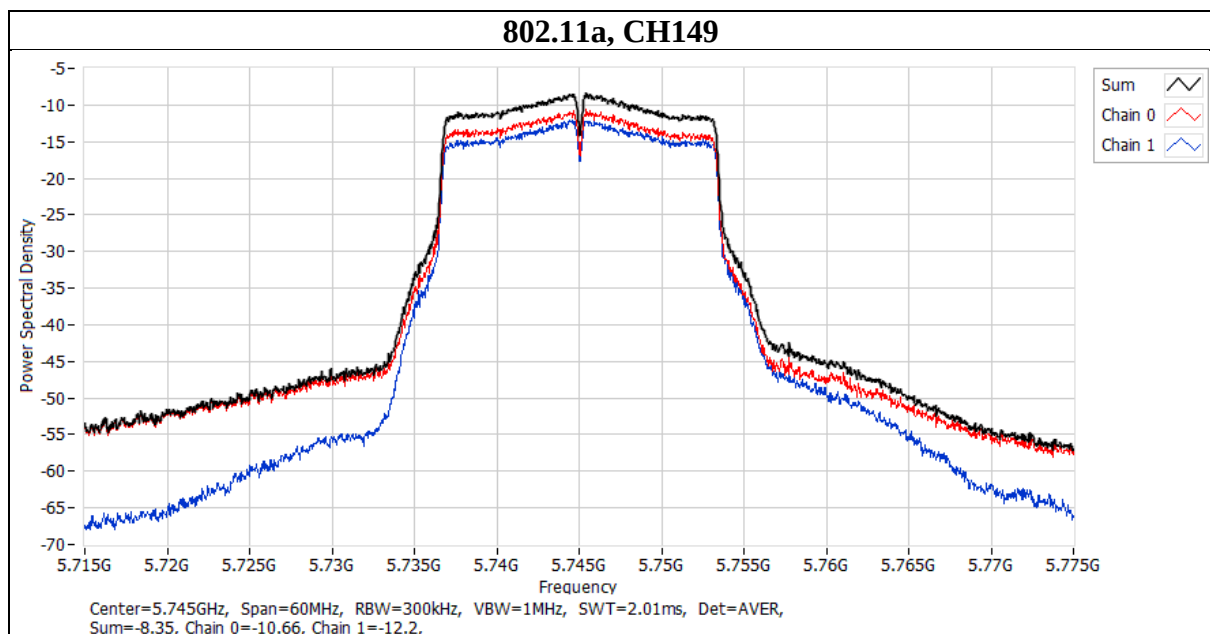
Mode (U-NII-2C)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ax(HE80)	106	5530	5.46	-16.88	11	PASS
	122	5610	5.46	-15.19	11	PASS

Mode (U-NII-2C)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ax(HE80)	106	5530	-19.49	-20.15
	122	5610	-17.01	-19.23



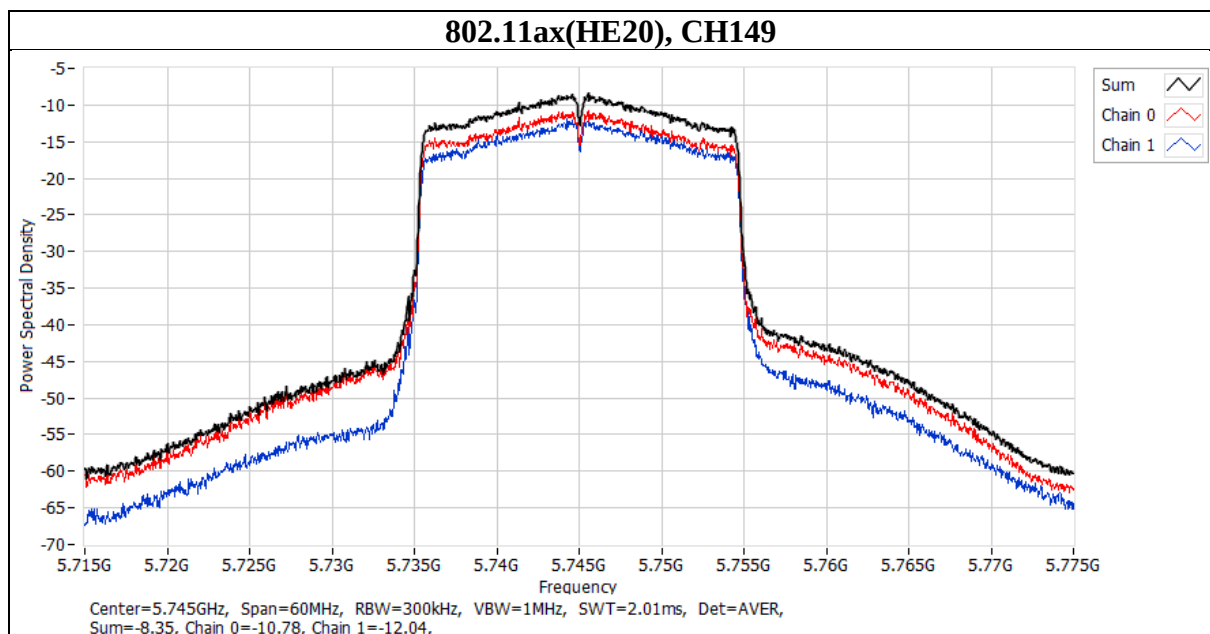
Mode (U-NII-3)	CH	Freq (MHz)	BWCF	Directional Gain (dBi)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
802.11a	149	5745	2.22	5.46	-6.13	30	PASS
	157	5785	2.22	5.46	-6.32	30	PASS
	165	5825	2.22	5.46	-6.16	30	PASS

Mode (U-NII-3)	CH	Freq (MHz)	PSD per Chain (dBm/500kHz)	
			Chain 0	Chain 1
802.11a	149	5745	-10.66	-12.03
	157	5785	-10.78	-12.2
	165	5825	-10.35	-12.6



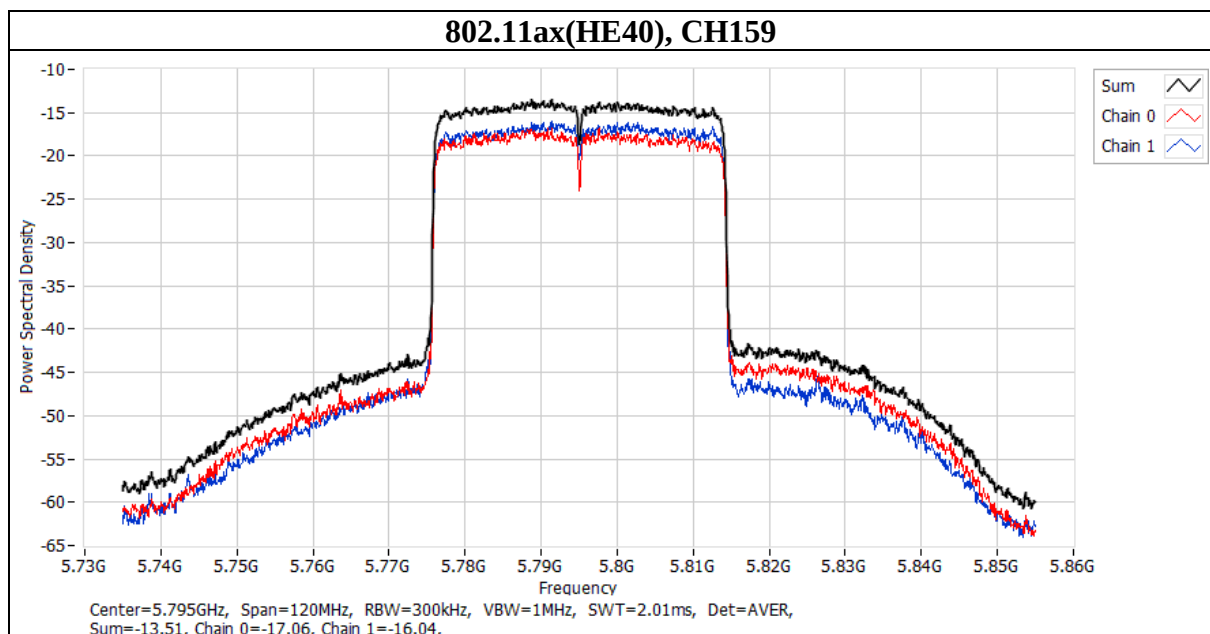
Mode (U-NII-3)	CH	Freq (MHz)	BWCF	Directional Gain (dBi)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
802.11ax(HE20)	149	5745	2.22	5.46	-6.14	30	PASS
	157	5785	2.22	5.46	-6.69	30	PASS
	165	5825	2.22	5.46	-6.52	30	PASS

Mode (U-NII-3)	CH	Freq (MHz)	PSD per Chain (dBm/500kHz)	
			Chain 0	Chain 1
802.11ax(HE20)	149	5745	-10.78	-11.95
	157	5785	-10.83	-12.44
	165	5825	-10.68	-12.55



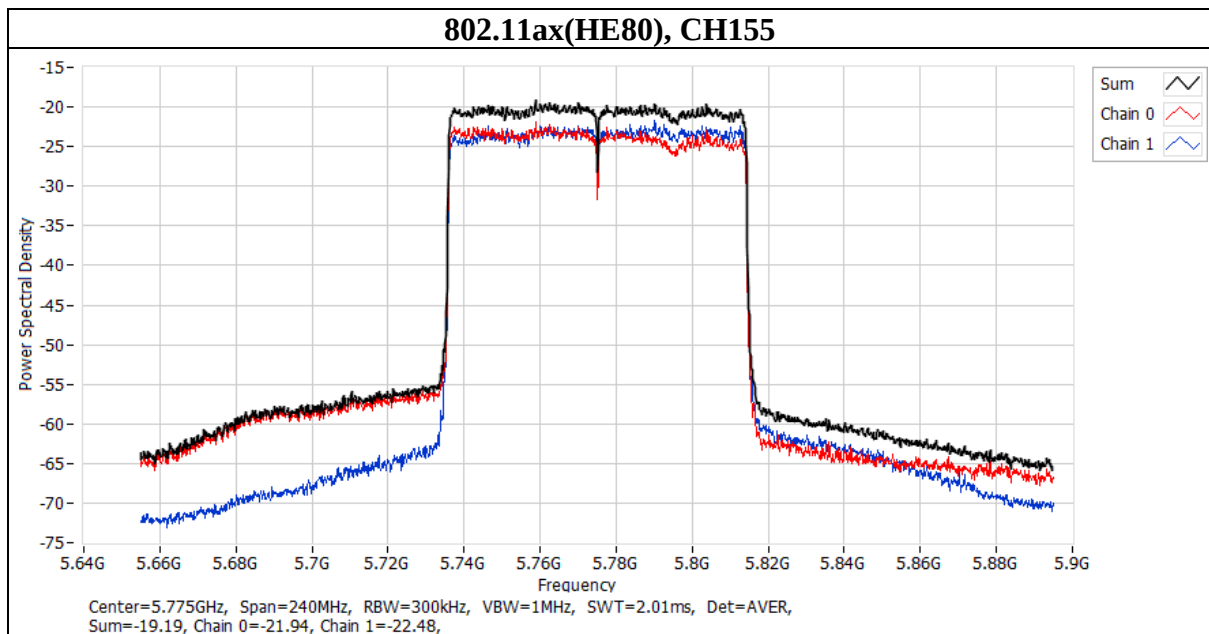
Mode (U-NII-3)	CH	Freq (MHz)	BWCF	Directional Gain (dBi)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
802.11ax(HE40)	151	5755	2.22	5.46	-11.53	30	PASS
	159	5795	2.22	5.46	-11.29	30	PASS

Mode (U-NII-3)	CH	Freq (MHz)	PSD per Chain (dBm/500kHz)	
			Chain 0	Chain 1
802.11ax(HE40)	151	5755	-16.52	-16.11
	159	5795	-16.78	-16.04



Mode (U-NII-3)	CH	Freq (MHz)	BWCF	Directional Gain (dBi)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
802.11ax(HE80)	155	5775	2.22	5.46	-16.97	30	PASS

Mode (U-NII-3)	CH	Freq (MHz)	PSD per Chain (dBm/500kHz)	
			Chain 0	Chain 1
802.11ax(HE80)	155	5775	-21.94	-21.73



Test Data

Frequency Stability Versus Temp.									
Operating Frequency: 5180 MHz									
TEMP. (°C)	Power Supply (Vac)	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)
35	120	5180.0191	3.69	5180.0207	4.00	5180.0162	3.13	5180.0172	3.32
30	120	5180.0166	3.20	5180.0178	3.44	5180.018	3.47	5180.016	3.09
20	120	5180.0085	1.64	5180.0061	1.18	5180.0079	1.53	5180.0094	1.81
10	120	5180.0069	1.33	5180.0077	1.49	5180.0074	1.43	5180.0048	0.93
0	120	5180.0072	1.39	5180.0115	2.22	5180.0069	1.33	5180.0098	1.89
TEMP. (°C)	Power Supply (Vac)	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	138	5180.0076	1.47	5180.0065	1.25	5180.007	1.35	5180.0098	1.89
20	120	5180.0085	1.64	5180.0061	1.18	5180.0079	1.53	5180.0094	1.81
20	102	5180.0081	1.56	5180.0066	1.27	5180.0082	1.58	5180.01	1.93

Underwriters Laboratories Taiwan Co., Ltd.

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

Telephone : +886-2-7737-3000

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

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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.

Underwriters Laboratories Taiwan Co., Ltd.

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

Telephone : +886-2-7737-3000

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

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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:

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

Underwriters Laboratories Taiwan Co., Ltd.

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

Telephone :+886-2-7737-3000

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

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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Note:

- a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
- b. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
- c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.

Peak

Frequency	RBW	VBW
9 kHz~150 kHz	200 Hz	600 Hz
150 kHz~30 MHz	10 kHz	30 kHz
30 MHz~1 GHz	120 kHz	360 kHz
Above 1GHz	1 MHz	3 MHz

Average for above 1GHz

RBW	VBW
1MHz	Refer to section 6.6 for duty cycle.

- d. All modes of operation were investigated (includes all external accessories) and the worst-case emissions are reported, the other emission levels were low against the limit.
- e. Test data of Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
- f. Test data of Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
- g. Test data of Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
- h. Test data of Notation "@" = Fundamental Frequency
- i. Test data of Notation "*" = Only required peak limit or the peak result under 20 dB above and complies with AVG limit, AVG result is deemed to comply with AVG limit.

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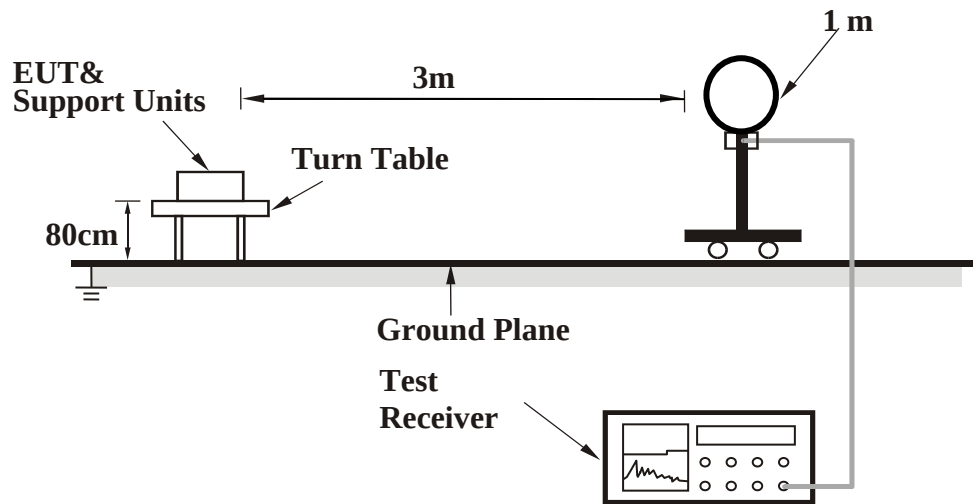
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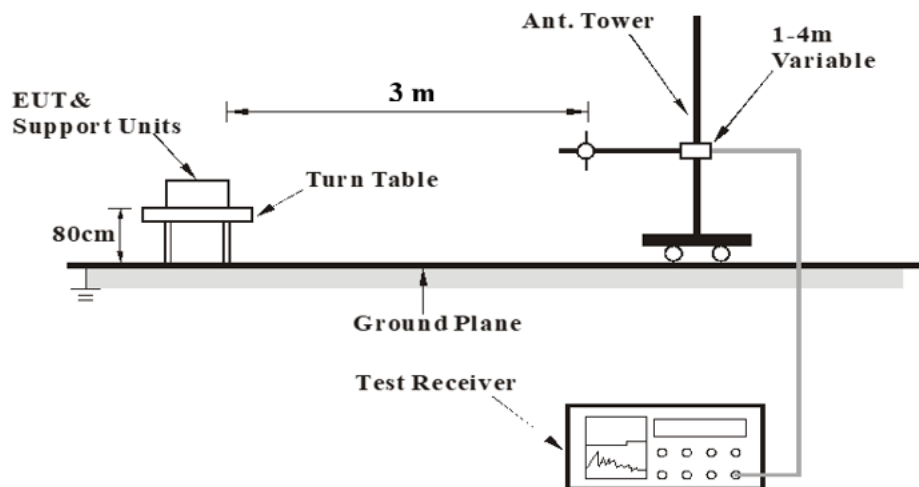
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Test Setup

<Frequency Range 9 kHz ~ 30 MHz>



<Frequency Range 30 MHz ~ 1 GHz >

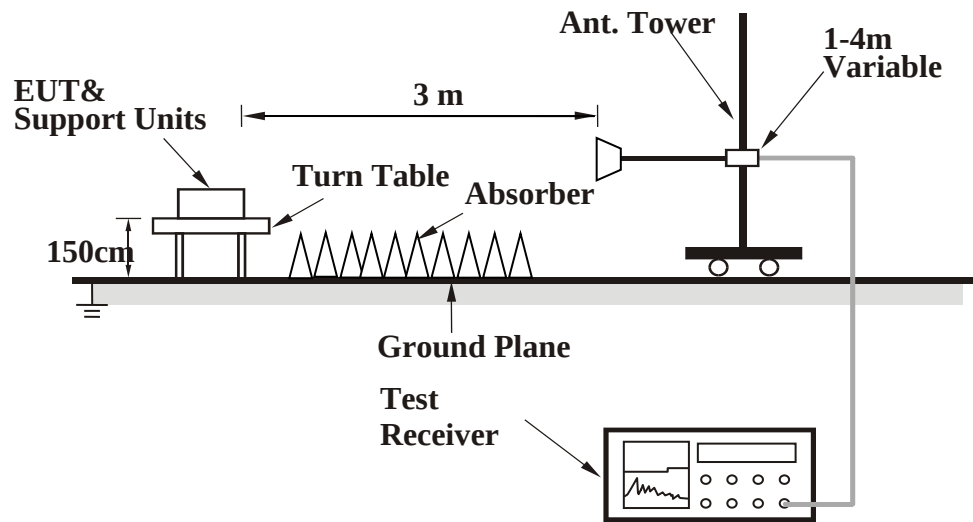


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<Frequency Range above 1 GHz>



For the actual test configuration, please refer to the Setup Configurations.

Test Data

Above 1 GHz

Mode	802.11a	Channel	36
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		5147.7	46.71	19.75	66.46	74	-7.54	PK
		5149.45	30.66	19.76	50.42	54	-3.58	AVG
	@	5180	87.84	19.67	107.51	N/A	N/A	PK
	@	5180	80.59	19.67	100.26	N/A	N/A	AVG
	*	10360	31.65	17.77	49.42	68.2	-18.78	PK
Vertical		5147.35	28.44	19.75	48.19	54	-5.81	AVG
		5148.75	41.8	19.76	61.56	74	-12.44	PK
	@	5180	82.8	19.67	102.47	N/A	N/A	PK
	@	5180	74.81	19.67	94.48	N/A	N/A	AVG
	*	10360	31.76	17.77	49.53	68.2	-18.67	PK

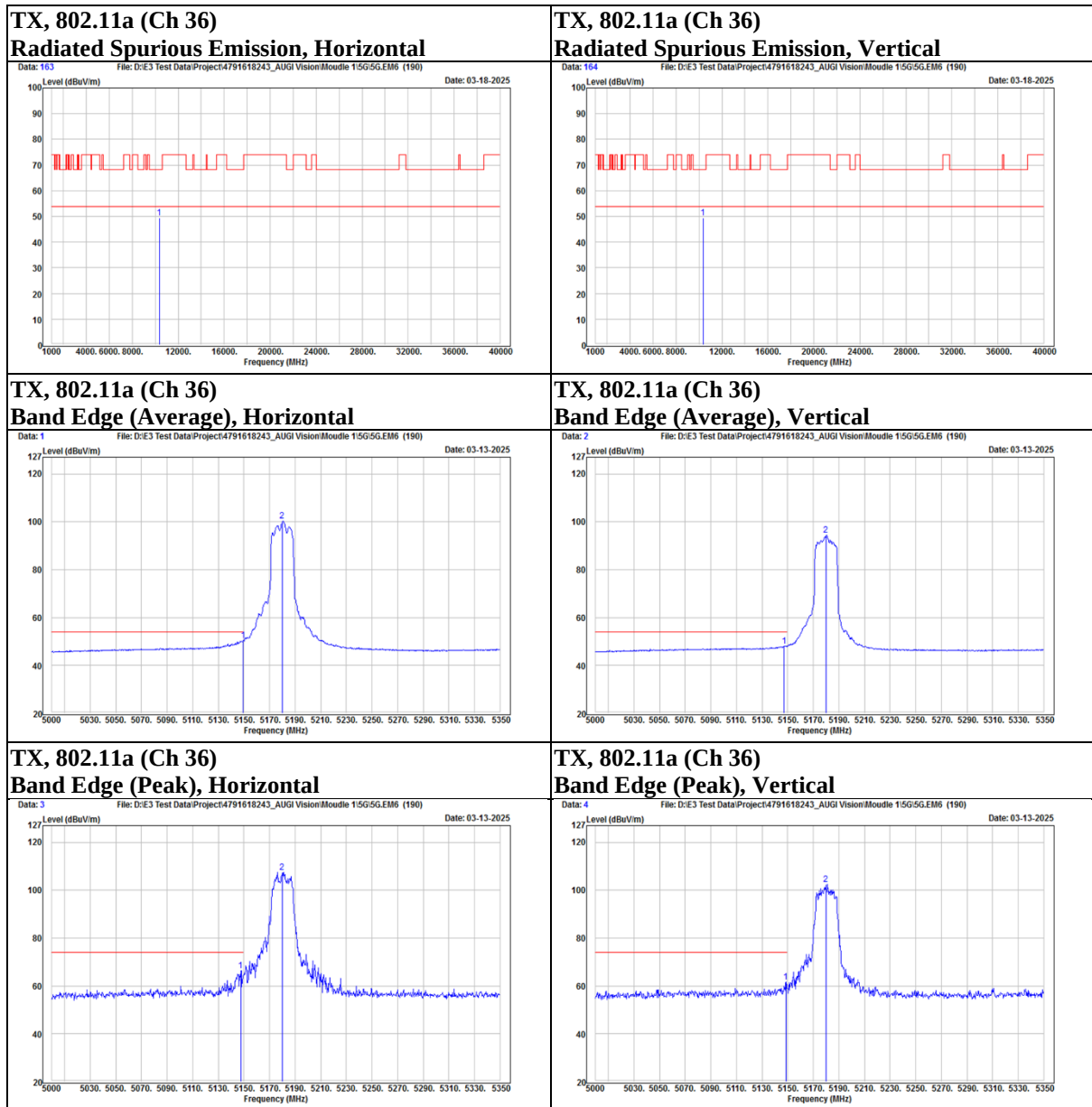
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Mode	802.11a	Channel	44
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		5149.45	28.39	19.76	48.15	54	-5.85	AVG
		5149.8	39.95	19.76	59.71	74	-14.29	PK
	@	5220	87.51	19.48	106.99	N/A	N/A	PK
	@	5220	81.18	19.48	100.66	N/A	N/A	AVG
	*	10440	31.66	18.13	49.79	68.2	-18.41	PK
Vertical		5147.35	38.96	19.75	58.71	74	-15.29	PK
		5149.1	27.69	19.76	47.45	54	-6.55	AVG
	@	5220	83	19.48	102.48	N/A	N/A	PK
	@	5220	74.7	19.48	94.18	N/A	N/A	AVG
	*	10440	31.57	18.13	49.7	68.2	-18.5	PK

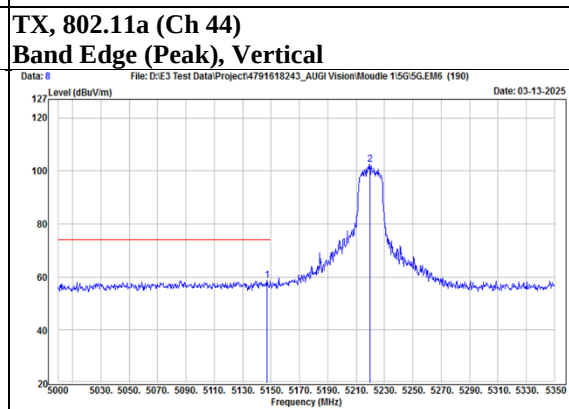
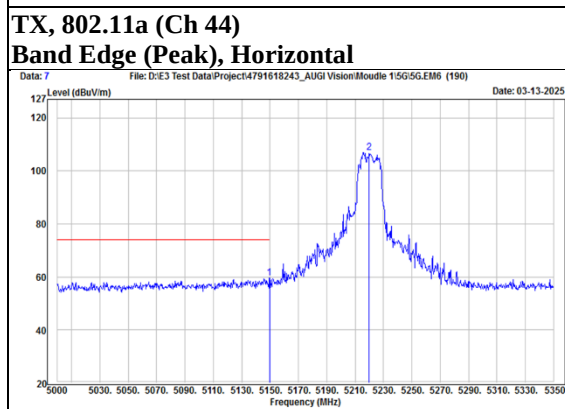
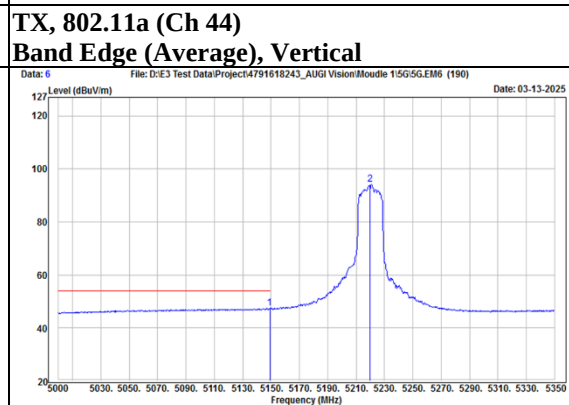
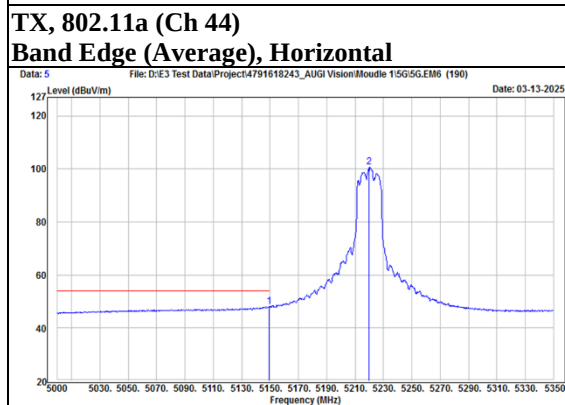
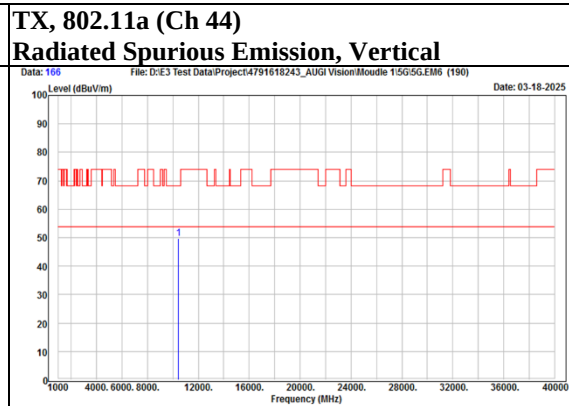
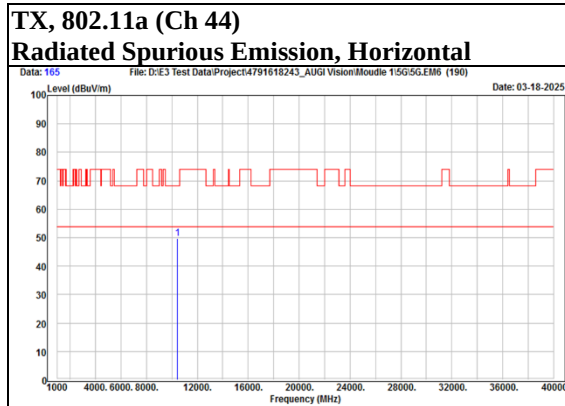
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Mode	802.11a	Channel	48
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		5105.7	39.92	19.66	59.58	74	-14.42	PK
		5135.45	27.71	19.73	47.44	54	-6.56	AVG
	@	5240	89.26	19.35	108.61	N/A	N/A	PK
	@	5240	81.27	19.35	100.62	N/A	N/A	AVG
	*	10480	31.06	18.26	49.32	68.2	-18.88	PK
Vertical		5142.1	39.25	19.74	58.99	74	-15.01	PK
		5143.5	27.53	19.74	47.27	54	-6.73	AVG
	@	5240	83.13	19.35	102.48	N/A	N/A	PK
	@	5240	75.4	19.35	94.75	N/A	N/A	AVG
	*	10480	31.88	18.26	50.14	68.2	-18.06	PK

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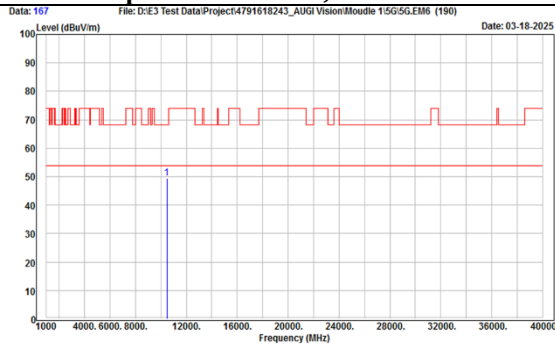
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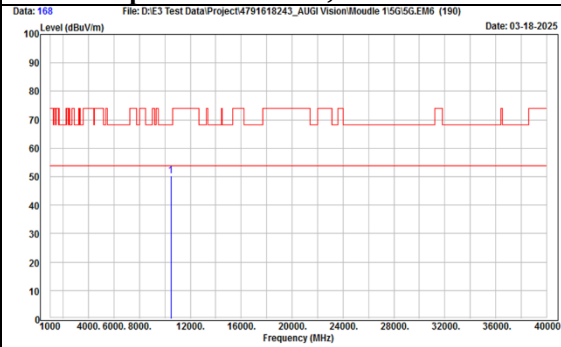
TX, 802.11a (Ch 48)

Radiated Spurious Emission, Horizontal



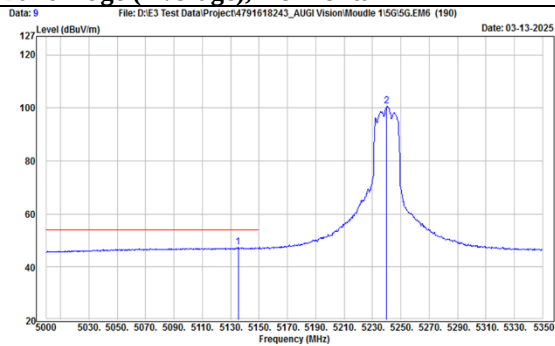
TX, 802.11a (Ch 48)

Radiated Spurious Emission, Vertical



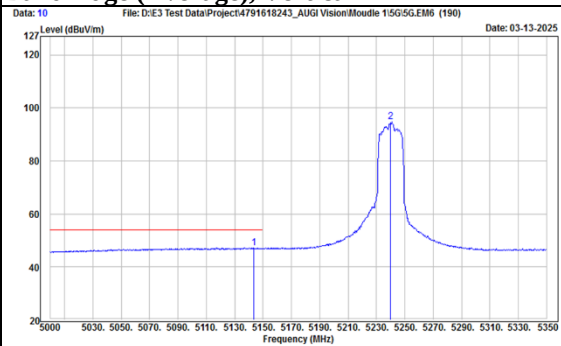
TX, 802.11a (Ch 48)

Band Edge (Average), Horizontal



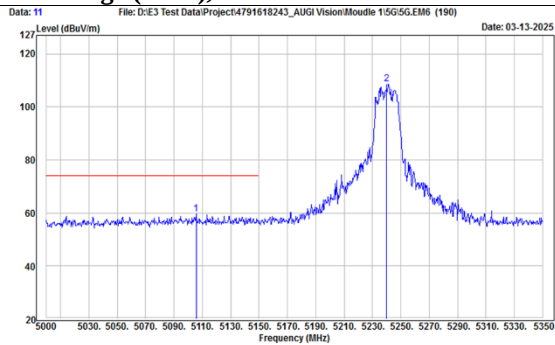
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Band Edge (Average), Vertical



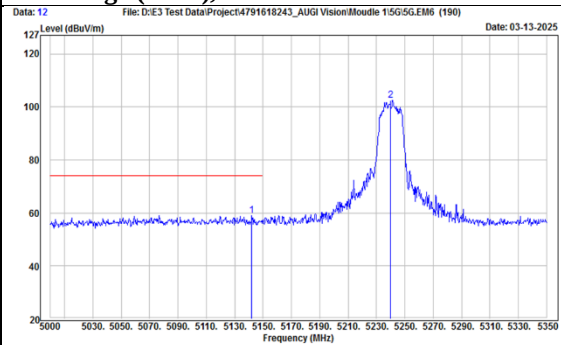
TX, 802.11a (Ch 48)

Band Edge (Peak), Horizontal



TX, 802.11a (Ch 48)

Band Edge (Peak), Vertical



Mode	802.11a	Channel	52
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	@	5260	89.11	19.24	108.35	N/A	N/A	PK
	@	5260	81.16	19.24	100.4	N/A	N/A	AVG
		5404.5	40.16	19.65	59.81	74	-14.19	PK
		5438.1	27.87	19.84	47.71	54	-6.29	AVG
	*	10520	31.27	18.3	49.57	68.2	-18.63	PK
Vertical	@	5260	83.8	19.24	103.04	N/A	N/A	PK
	@	5260	75.08	19.24	94.32	N/A	N/A	AVG
		5448.3	40.05	19.89	59.94	74	-14.06	PK
		5453.7	27.74	19.92	47.66	54	-6.34	AVG
	*	10520	31.09	18.3	49.39	68.2	-18.81	PK

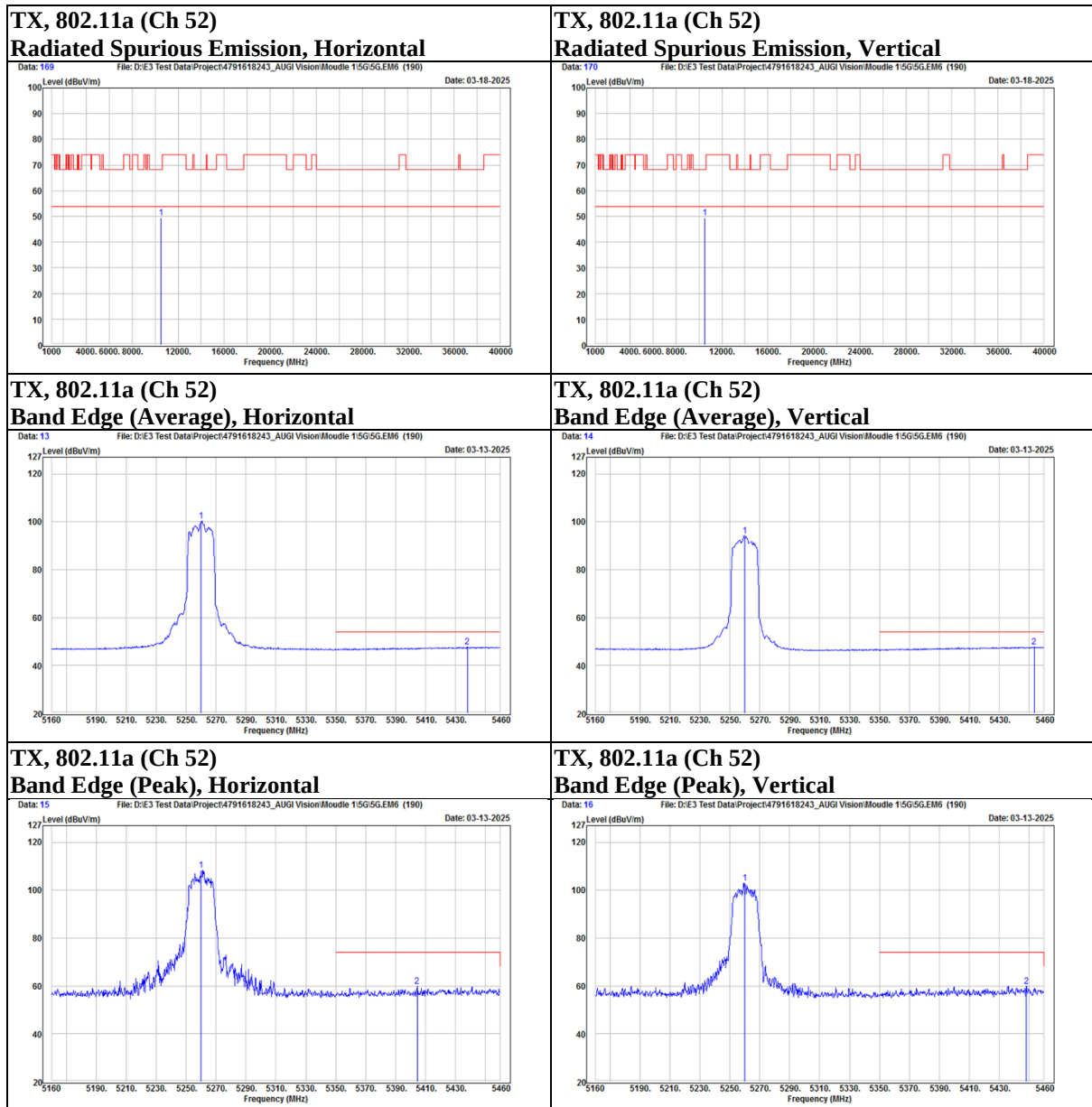
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Mode	802.11a	Channel	60
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	@	5300	89.49	19.08	108.57	N/A	N/A	PK
	@	5300	82.13	19.08	101.21	N/A	N/A	AVG
		5352	44.13	19.3	63.43	74	-10.57	PK
		5352.6	30.25	19.31	49.56	54	-4.44	AVG
	*	10600	31.88	18.22	50.1	74	-23.9	PK
Vertical	@	5300	82.11	19.08	101.19	N/A	N/A	PK
	@	5300	74.11	19.08	93.19	N/A	N/A	AVG
		5356.5	40.8	19.34	60.14	74	-13.86	PK
		5457.3	27.77	19.93	47.7	54	-6.3	AVG
	*	10600	31.61	18.22	49.83	74	-24.17	PK

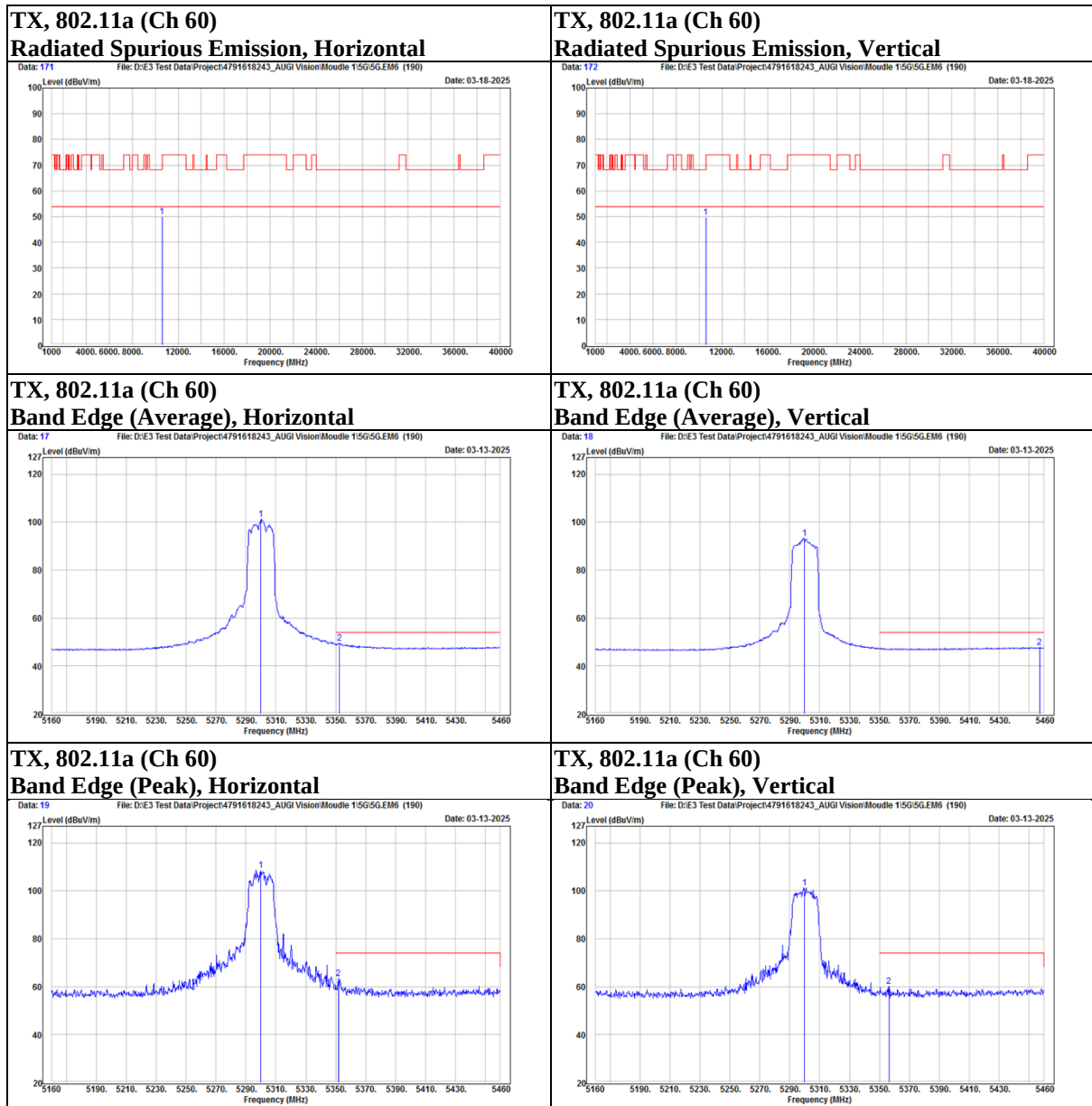
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Mode	802.11a	Channel	64
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	@	5320	89.03	19.17	108.2	N/A	N/A	PK
	@	5320	81.98	19.17	101.15	N/A	N/A	AVG
		5352.3	35.46	19.3	54.76	54	0.76	AVG
		5353.2	51.49	19.31	70.8	74	-3.2	PK
	*	10640	31.58	18.35	49.93	74	-24.07	PK
Vertical	@	5320	82.56	19.17	101.73	N/A	N/A	PK
	@	5320	74.42	19.17	93.59	N/A	N/A	AVG
		5350.2	31.16	19.29	50.45	54	-3.55	AVG
		5352.3	43.83	19.3	63.13	74	-10.87	PK
	*	10640	32.36	18.35	50.71	74	-23.29	PK

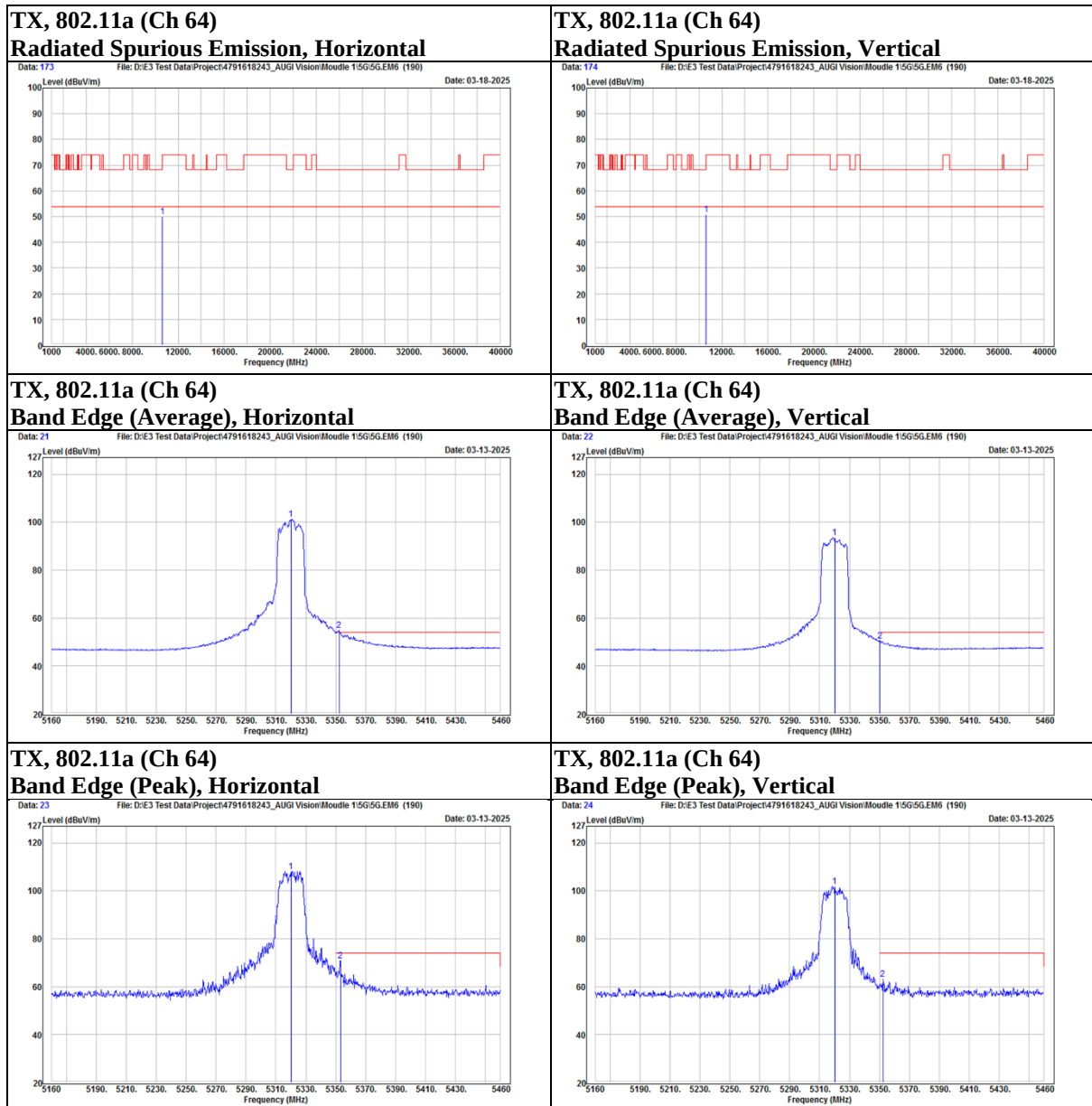
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Mode	802.11a	Channel	100
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		5453.9	41.8	19.92	61.72	74	-12.28	PK
		5459.85	29.69	19.95	49.64	54	-4.36	AVG
		5468.6	47.99	19.99	67.98	68.2	-0.22	PK
	@	5500	91.86	20.13	111.99	N/A	N/A	PK
	@	5500	82.69	20.13	102.82	N/A	N/A	AVG
	*	11000	31.01	18.57	49.58	74	-24.42	PK
Vertical		5439.55	39.92	19.85	59.77	74	-14.23	PK
		5456.7	28.01	19.93	47.94	54	-6.06	AVG
		5468.6	40.92	19.99	60.91	68.2	-7.29	PK
	@	5500	83.72	20.13	103.85	N/A	N/A	PK
	@	5500	75.11	20.13	95.24	N/A	N/A	AVG
	*	11000	31.04	18.57	49.61	74	-24.39	PK

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