

RADIO TEST REPORT

Product : 802.11ax/ac/a/b/g/n 2T2R Wi-Fi USB Module

Model Name : WUBT-281AX [PU]

Series Model : WUBT-281AX [MU], WUBT-281AX [M9W],
WUBT-281AX [P9W]

FCC ID : RYK-WUBT281AX

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

Received Date : 2026/1/12

Test Date : 2026/01/19 ~ 2026/08/07

Issued Date : 2026/8/11

Applicant : SparkLAN Communications, Inc.
5F, No. 199, Ruihu St., Neihu Dist., Taipei City 114067, Taiwan

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



The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report are responsible of the test sample(s) provided by the client only and are not to be used to indicate applicability to other similar products.

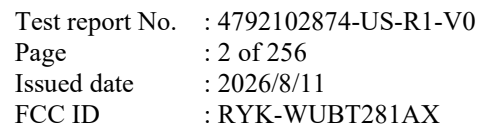
Underwriters Laboratories Taiwan Co., Ltd.

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



Original Test Report No.: 4792102874-US-R1-V0

[illegible]

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

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

Table of Contents

1. Attestation of Test Results	4
2. Summary of Test Results	5
3. Test Methodology and Reference Procedures	6
4. Facilities and Accreditation	6
5. Measurement Uncertainty	7
6. Equipment under Test.....	8
6.1. Description of EUT	8
6.2. Channel List	10
6.3. Test Condition.....	12
6.4. Description of Available Antennas	13
6.5. Test Mode Applicability and Tested Channel Detail	14
6.6. Duty cycle	17
7. Test Equipment	20
8. Description of Test Setup	22
9. Test Results	24
9.1. 6dB Bandwidth	24
9.2. 26dB Bandwidth	32
9.3. Occupied Bandwidth.....	40
9.4. Conducted output power	48
9.5. Power Spectral Density	52
9.6. Frequency Stability	83
9.7. Radiated Spurious Emission	85
9.8. AC Power Line Conducted Emission	253

1. Attestation of Test Results

APPLICANT: SparkLAN Communications, Inc.
5F, No. 199, Ruihu St., Neihu Dist., Taipei City 114067, Taiwan

MANUFACTURER: SparkLAN Communications, Inc.
5F, No. 199, Ruihu St., Neihu Dist., Taipei City 114067, Taiwan

EUT DESCRIPTION: 802.11ax/ac/a/b/g/n 2T2R Wi-Fi USB Module

BRAND: SparkLAN

MODEL: WUBT-281AX [PU]

SERIES MODEL: WUBT-281AX [MU], WUBT-281AX [M9W],
WUBT-281AX [P9W]

SAMPLE STAGE: Engineering Verification Test Sample

DATE of TESTED: 2026/01/19 ~ 2026/08/07

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

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

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

Prepared By:



Sally Lu
Project Handler

Date : 2026/8/11

Approved and Authorized By:



Kent Liu
Senior Laboratory Engineer

Date : 2026/8/11

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

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.: 4792102874-US-R2-V0

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

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 C63.10-2020+Cor.1-2023+C63.10a-2024+Errata to C63.10a-2024 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.

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

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	3.0 dB
RF Conducted	9 kHz - 40GHz	2.4 dB
Radiated disturbance below 30MHz	9 kHz - 30 MHz	1.9 dB
Radiated disturbance below 1 GHz	30MHz ~ 1GHz	5.6 dB
Radiated disturbance above 1 GHz	1GHz ~ 40GHz	4.6 dB

The EUT support table is constructed of high-density Expandable Polystyrene (EPS) with dimensions of 1 m × 1.5 m.

The Measurement Uncertainty (MU) report is prepared in accordance with CISPR 16-4-2:2011-06; the potential impact of the setup table material has been evaluated and included as a component of the overall uncertainty value.

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

6. Equipment under Test

6.1. Description of EUT

Product	802.11ax/ac/a/b/g/n 2T2R Wi-Fi USB Module
Brand Name	SparkLAN
Model Name	WUBT-281AX [PU]
Series Model	WUBT-281AX [MU], WUBT-281AX [M9W], WUBT-281AX [P9W]
Normal Voltage	5Vdc from Host

Operating Frequency	5180 ~ 5240MHz, 5260 ~ 5320MHz, 5500 ~ 5720MHz, 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
Device Type	Client
Maximum Output Power	5180 ~ 5240 MHz: 16.69 dBm
	5260 ~ 5320 MHz: 16.81 dBm
	5500 ~ 5720 MHz: 20.84 dBm
	5745 ~ 5825 MHz: 25.17 dBm
Sample ID	Conducted Test:9323067
	Radiated Test:9323067

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

Note:

1. The models difference table as below:

Model	Antenna Type	Difference
WUBT-281AX [MU]	External Antenna	-
WUBT-281AX [PU]	PCB Antenna	1. Remove R32/R33(0R), CON1/CON2(IPEX) 2. Add CON3/CON4(RF Switch), L2/C2(10pF), L1(0R), C3/L4(1.5nH), C1(2.7nH) to printed antenna matching.
WUBT-281AX [M9W]	External Antenna	1. USB Connector is changed to 9-Pin Wafer.
WUBT-281AX [P9W]	PCB Antenna	1. Remove R32/R33(0R), CON1/CON2(IPEX). 2. Add CON3/CON4(RF Switch), L2/C2(10pF), L1(0R), C3/L4(1.5nH), C1(2.7nH) to printed antenna matching. 3. USB Connector change to Wafer 9-pin.

*Based on the pre-testing of these four models, the WUBT-281AX [PU] configuration was identified as the worst-case scenario. Consequently, all final compliance testing was conducted using this model.

2. 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 bandwidth system, 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.

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

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 is 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 is provided for 5G WLAN 80MHz bandwidth system:

Channel	Frequency (MHz)
58	5290

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 channels are provided for 5G WLAN 80MHz bandwidth system:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
106	5530	138	5690
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 is 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/ 63~66%RH	5Vdc	2026/02/04~ 2026/08/07	Jubo Shen
Radiated Spurious Emission	966-2	22~26°C/ 62~68%RH	5Vdc	2026/01/19~ 2026/02/10	Eric Peng
AC power Line Conducted Emission	SR1	23°C/ 67%RH	120Vac/ 60Hz	2026/02/02	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).

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

6.4. Description of Available Antennas

Ant. No.	Transmitter Circuit	Frequency Range	Brand Name	Model Name	Maximum Gain (dBi)	Ant. Type	Connector Type
1	Chain0+1	2.4GHz 5GHz	SparkLAN	AD-103AG	2.02 2.03	Dipole	RP-SMA
2	Chain0+1	2.4GHz 5GHz	SparkLAN	AD-305N	5 5.53	Dipole	RP-SMA
3	Chain0+1	2.4GHz 5GHz	SparkLAN	AD-303N	3.14 3.45	Dipole	RP-SMA
4	Chain0+1	2.4GHz 5GHz	SparkLAN	AD-302N	3.14 2.87	Dipole	RP-SMA
5	Chain0+1	2.4GHz 5GHz	SparkLAN	AD-315N	3 5	Dipole	i-pex(MHF)
6	Chain0	2.4GHz 5GHz	SparkLAN	ANTENNA-L	-13.74 4.86	PCB	N/A
7	Chain1	2.4GHz 5GHz	SparkLAN	ANTENNA-R	-13.33 6.05	PCB	N/A

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
	802.11ac (VHT20)		OFDM	36 to 48	36, 44, 48	MCS0 Nss1
	802.11ac (VHT40)			38 to 46	38, 46	MCS0 Nss1
	802.11ac (VHT80)			42	42	MCS0 Nss1
	802.11ax (HE20)		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
	802.11ac (VHT20)		OFDM	52 to 64	52, 60, 64	MCS0 Nss1
	802.11ac (VHT40)			54 to 62	54, 62	MCS0 Nss1
	802.11ac (VHT80)			58	58	MCS0 Nss1
	802.11ax (HE20)		OFDM	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	5500-5720	OFDM	100 to 144	100, 116, 140, 144	6 Mbps
	802.11ac (VHT20)		OFDM	100 to 144	100, 116, 140, 144	MCS0 Nss1
	802.11ac (VHT40)			102 to 142	102, 110, 134,142	MCS0 Nss1
	802.11ac (VHT80)			106 to 138	106, 122, 138	MCS0 Nss1
	802.11ax (HE20)		OFDM	100 to 144	100, 116, 140, 144	MCS0 Nss1
	802.11ax (HE20)			102 to 142	102, 110, 134,142	MCS0 Nss1
	802.11ax (HE20)			106 to 138	106, 122, 138	MCS0 Nss1
	802.11ax (HE20)			114	114	MCS0 Nss1
	802.11a	5745-5825	OFDM	149 to 165	149, 157, 165	6 Mbps
	802.11ac (VHT20)		OFDM	149 to 165	149, 157, 165	MCS0 Nss1
	802.11ac (VHT40)			151 to 159	151, 159	MCS0 Nss1
	802.11ac (VHT80)			155	155	MCS0 Nss1
	802.11ax (HE20)		OFDM	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	OFDM	52 to 64	52, 60, 64	6 Mbps
	802.11a	5500-5720	OFDM	100 to 144	100, 116, 140, 144	6 Mbps
	802.11a	5745-5825	OFDM	149 to 165	149, 157, 165	6 Mbps

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 Item	Mode	Frequency Range(MHz)	Modulation Type	Available Channel	Test Channel	Data Rate
Radiated Emissions (Below 1GHz)	802.11a	5745-5825	OFDM	149 to 165	157	6 Mbps
AC Power Line Conducted Emission	802.11a	5745-5825	OFDM	149 to 165	157	6 Mbps
Antenna Port Conducted Measurement	802.11a	5180-5240	OFDM	36 to 48	36, 44, 48	6 Mbps
	802.11ac (VHT20)			36 to 48	36, 44, 48	MCS0 Nss1
	802.11ac (VHT40)			38 to 46	38, 46	MCS0 Nss1
	802.11ac (VHT80)			42	42	MCS0 Nss1
	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
	802.11ac (VHT20)			52 to 64	52, 60, 64	MCS0 Nss1
	802.11ac (VHT40)			54 to 62	54, 62	MCS0 Nss1
	802.11ac (VHT80)			58	58	MCS0 Nss1
	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	5500-5720	OFDM	100 to 144	100, 116, 140, 144	6 Mbps
	802.11ac (VHT20)			100 to 144	100, 116, 140, 144	MCS0 Nss1
	802.11ac (VHT40)			102 to 142	102, 110, 134,142	MCS0 Nss1
	802.11ac (VHT80)			106 to 138	106, 122, 138	MCS0 Nss1
	802.11ax (HE20)			100 to 144	100, 116, 140, 144	MCS0 Nss1
	802.11ax (HE20)			102 to 142	102, 110, 134,142	MCS0 Nss1
	802.11ax (HE20)			106 to 138	106, 122, 138	MCS0 Nss1
	802.11ax (HE20)			114	114	MCS0 Nss1
	802.11a	5745-5825	OFDM	149 to 165	149, 157, 165	6 Mbps
	802.11ac (VHT20)			149 to 165	149, 157, 165	MCS0 Nss1
	802.11ac (VHT40)			151 to 159	151, 159	MCS0 Nss1
	802.11ac (VHT80)			155	155	MCS0 Nss1
	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

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

- The dipole antenna was evaluated in two orthogonal positions: lay and stand. Based on the investigation, the stand orientation represented the worst-case scenario. Consequently, all final radiated emission tests were conducted with the dipole antenna in the stand position.
- For the Dipole antenna, Among the available dipole antennas, Antennas No. 1 to No. 5. After evaluation, Antenna No. 2 was identified as the worst-case configuration and was selected for final testing.
- For the PCB antenna, the EUT was assessed across three orthogonal axes: X-Y, Y-Z, and X-Z. The Y-Z plane was identified as the worst-case orientation. Therefore, all final radiated emission tests were performed with the EUT positioned in the Y-Z plane.
- PCB antennas No. 6 and No. 7 are different in type from antennas No. 1 to 5. All Radiated subsequent tests are also performed using this antenna.
- 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 157 has the highest RF output power. Therefore, the AC conduction were performed using this worst-case mode.
- In the transmit mode, 802.11a channel 157 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)

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	1.345	1.365	0.9853	N/A	10Hz
802.11ac(VHT20)	1.265	1.295	0.9768	0.10	1kHz
802.11ac(VHT40)	0.592	0.647	0.9150	0.39	2kHz
802.11ac(VHT80)	0.278	0.329	0.8450	0.73	5.1kHz
802.11ax(HE20)	1.145	1.185	0.9662	0.15	1kHz
802.11ax(HE40)	0.588	0.643	0.9145	0.39	2kHz
802.11ax(HE80)	0.294	0.346	0.8497	0.71	5.1kHz

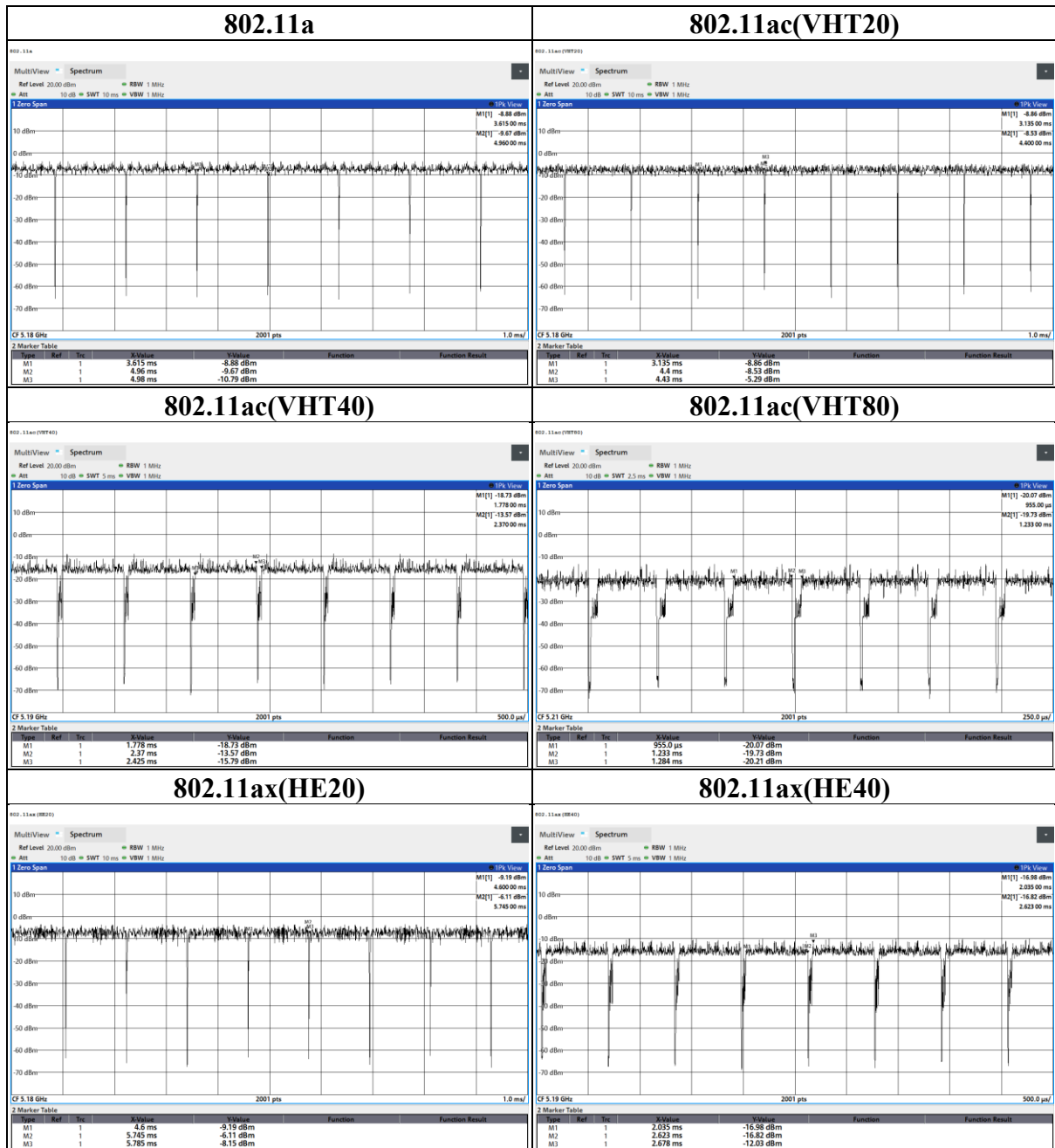
Underwriters Laboratories Taiwan Co., Ltd.

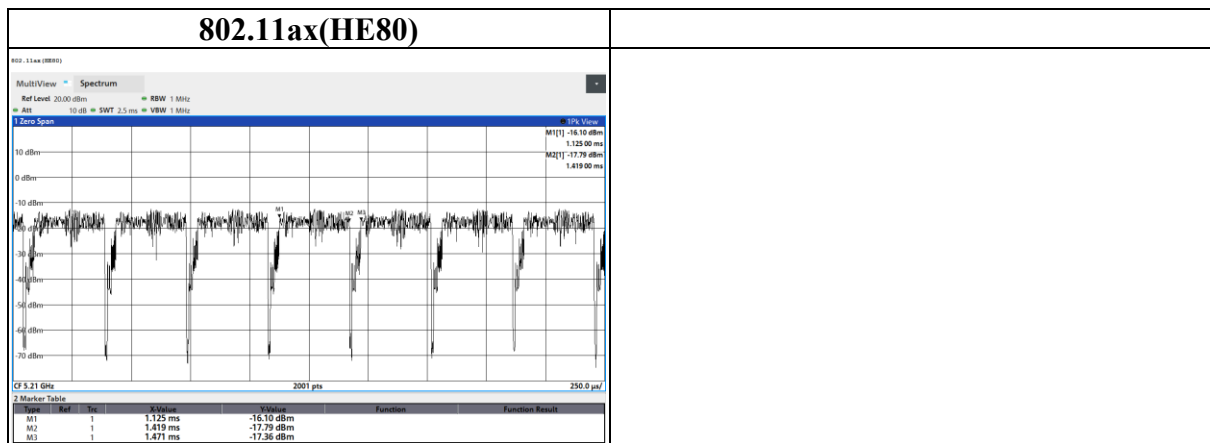
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

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

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





7. Test Equipment

Test Equipment List					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Expired date
Radiated Spurious Emission					
Spectrum Analyzer	Keysight	N9010A	MY56070818	2025/3/12	2026/3/11
EMI Test Receiver	Rohde & Schwarz	ESR7	101754	2025/12/9	2026/12/8
Loop Antenna	ETS lindgren	6502	00213440	2025/11/14	2026/11/13
Trilog-Broadband Antenna with 5dB Attenuator	Schwarzbeck & EMCI	VULB 9168 & N-6-05	774 & AT-N0538	2025/12/23	2026/12/22
Horn Antenna (1-18 GHz)	Schwarzbeck	BBHA 9120 D	01690	2025/11/18	2026/11/17
Horn Antenna (18-40 GHz)	Schwarzbeck	BBHA 9170	781	2025/12/2	2026/12/1
Preamplifier (30-1000 MHz)	EMCI	EMC330E	980405	2025/5/12	2026/5/11
Preamplifier (1-18 GHz)	EMCI	EMC051835BE	980406	2025/12/26	2026/12/25
Preamplifier (18-40GHz)	EMCI	EMC184040SEE	980426	2025/4/7	2026/4/6
Cables (9k-18 GHz)	Hanyitek	K1K50-UP0264-K1K50-2500	170214-4 & 170425-2	2025/11/21	2026/11/20
Cables (18-40GHz)	Hanyitek	K1K50-UP0264-K1K50-2500	170214-1 & 170214-2	2025/11/21	2026/11/20

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 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
				2026/2/2	2027/2/1
Signal Analyzer	Rohde & Schwarz	FSV40	101490	2025/6/17	2026/6/16
				2026/6/2	2027/6/1
Attenuator	EMCI	EMC-40ATK2W10	17002	2025/10/28	2026/10/27
USB Power Sensor	Anritsu	MA24408A	12031	2025/6/24	2026/6/23
				2026/6/16	2027/6/15
Temperature & Humidity Test Chamber	GIANT FORCE	GTH-150- 40-CP-AR	MAA1701-010	2025/2/25	2026/2/24
				2026/2/2	2027/2/1
AC power Line Conducted Emissio					
EMI Test Receiver	Rohde & Schwarz	ESR7	101753	2025/9/18	2026/9/17
Two-Line V-Network	Rohde & Schwarz	ENV216	102136	2025/5/27	2026/5/26
Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	2025/8/27	2026/8/26
Cables	TITAN	CFD200	T0732ACFD 20020A300-2	2025/4/21	2026/4/20

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

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

8. Description of Test Setup

Tx Mode

Support Equipment

ID	Equipment	Brand Name	Model Name	S/N	Remark
A	Laptop	DELL	Latitude E5470	3JFKWF2	Provide by Lab

I/O Cables

ID	Equipment	Brand Name	Model Name	Length (m)	Remark
1	USB Type A Male to Female	i-wiz	US-44	0.8	Provided by Lab

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

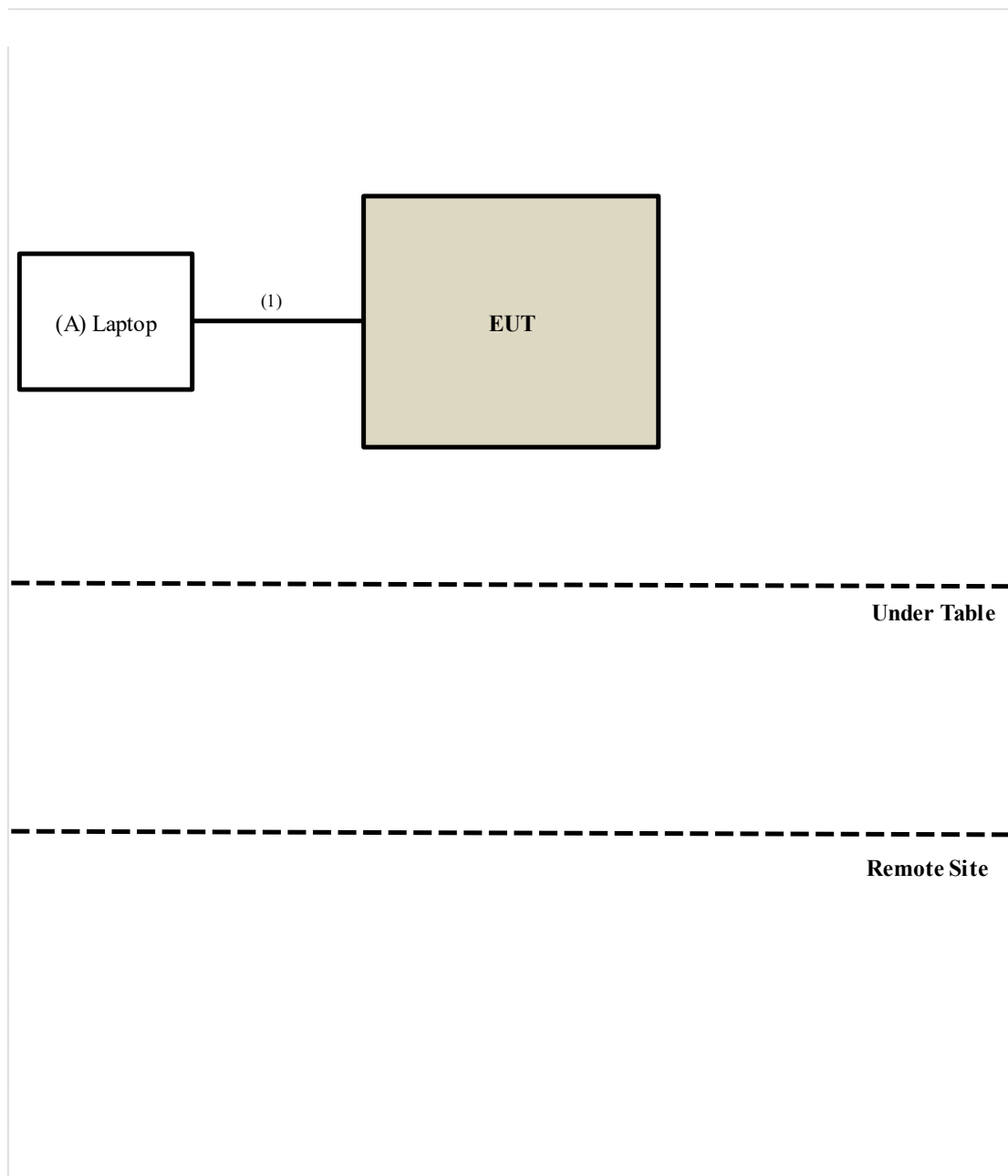
Doc No: Form-ULID-004739 (DCS:17-EM-F0878) / 6.1

Test Setup

Controlled using a bespoke application (AX Series MP Toolkit Version mp_v1.0.54) 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



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

9. Test Results

9.1. 6dB Bandwidth

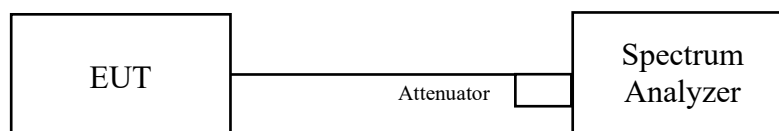
Requirements

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

Test procedure

- Set resolution bandwidth (RBW) = 1 Range of 1% to 5% of the OBW but not less than 100 kHz.
* Since using 100kHz yields the smallest bandwidth, 100kHz was selected for this evaluation.
- 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.

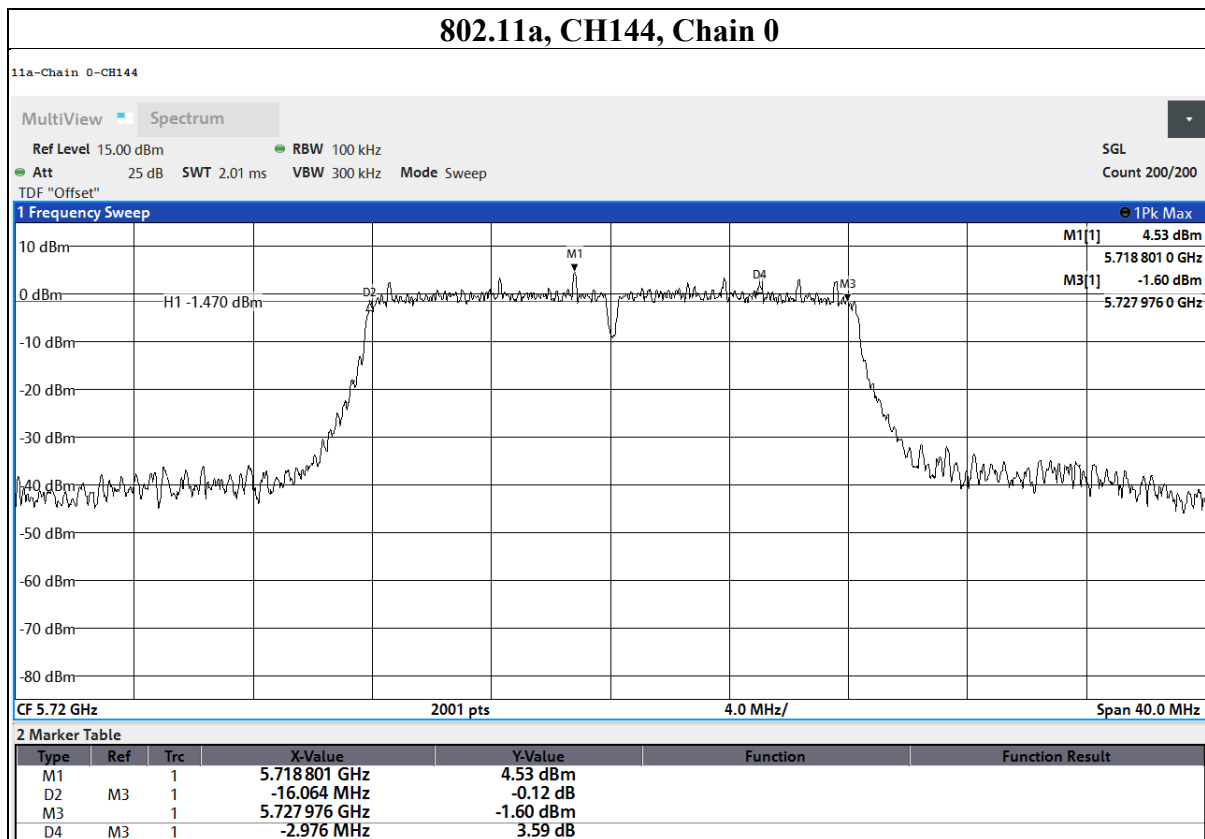
Test Setup



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	13.088	13.083	0.5	PASS
	144 (U-NII-2C+U-NII-3)	5720	16.064	16.347	0.5	PASS
	144 (U-NII-3)	5720	2.976	3.264	0.5	PASS
	149	5745	16.322	16.045	0.5	PASS
	157	5785	16.05	16.317	0.5	PASS
	165	5825	15.938	16.32	0.5	PASS



Underwriters Laboratories Taiwan Co., Ltd.

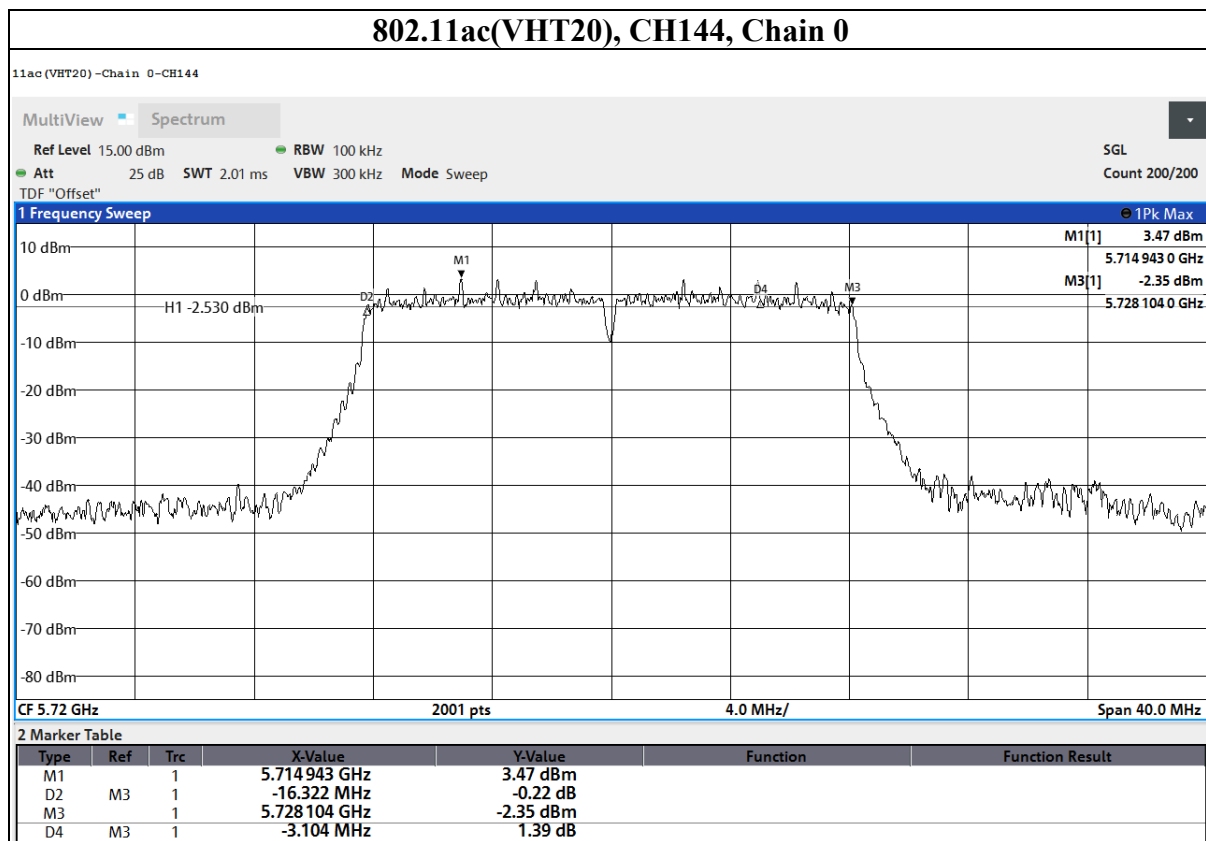
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

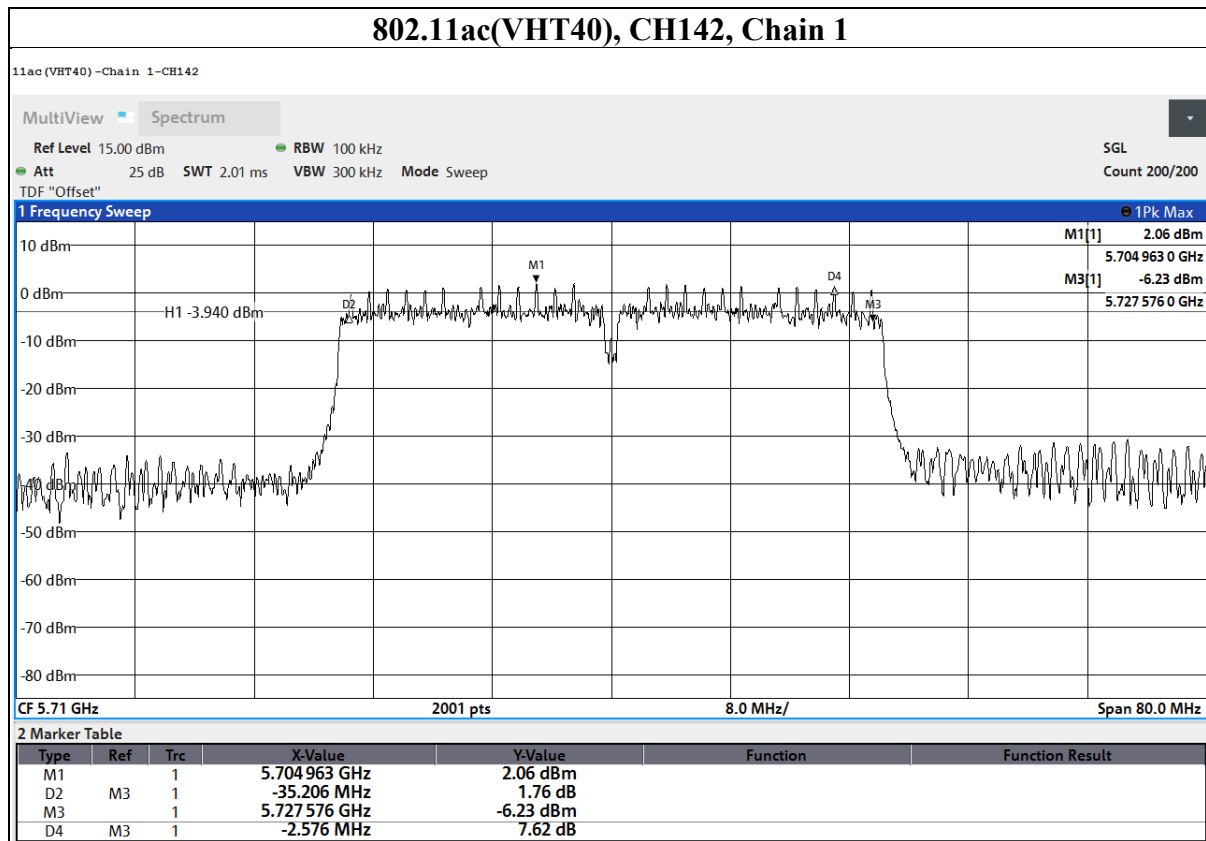
Facsimile (FAX) : +886-3-583-7948

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

Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT20)	144 (U-NII-2C)	5720	13.218	13.227	0.5	PASS
	144 (U-NII-2C+U-NII-3)	5720	16.322	16.347	0.5	PASS
	144 (U-NII-3)	5720	3.104	3.12	0.5	PASS
	149	5745	16.312	16.315	0.5	PASS
	157	5785	16.334	16.323	0.5	PASS
	165	5825	16.305	16.318	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	32.625	32.63	0.5	PASS
	142 (U-NII-2C+U-NII-3)	5710	35.244	35.206	0.5	PASS
	142 (U-NII-3)	5710	2.619	2.576	0.5	PASS
	151	5755	35.196	35.184	0.5	PASS
	159	5795	35.215	35.181	0.5	PASS



Underwriters Laboratories Taiwan Co., Ltd.

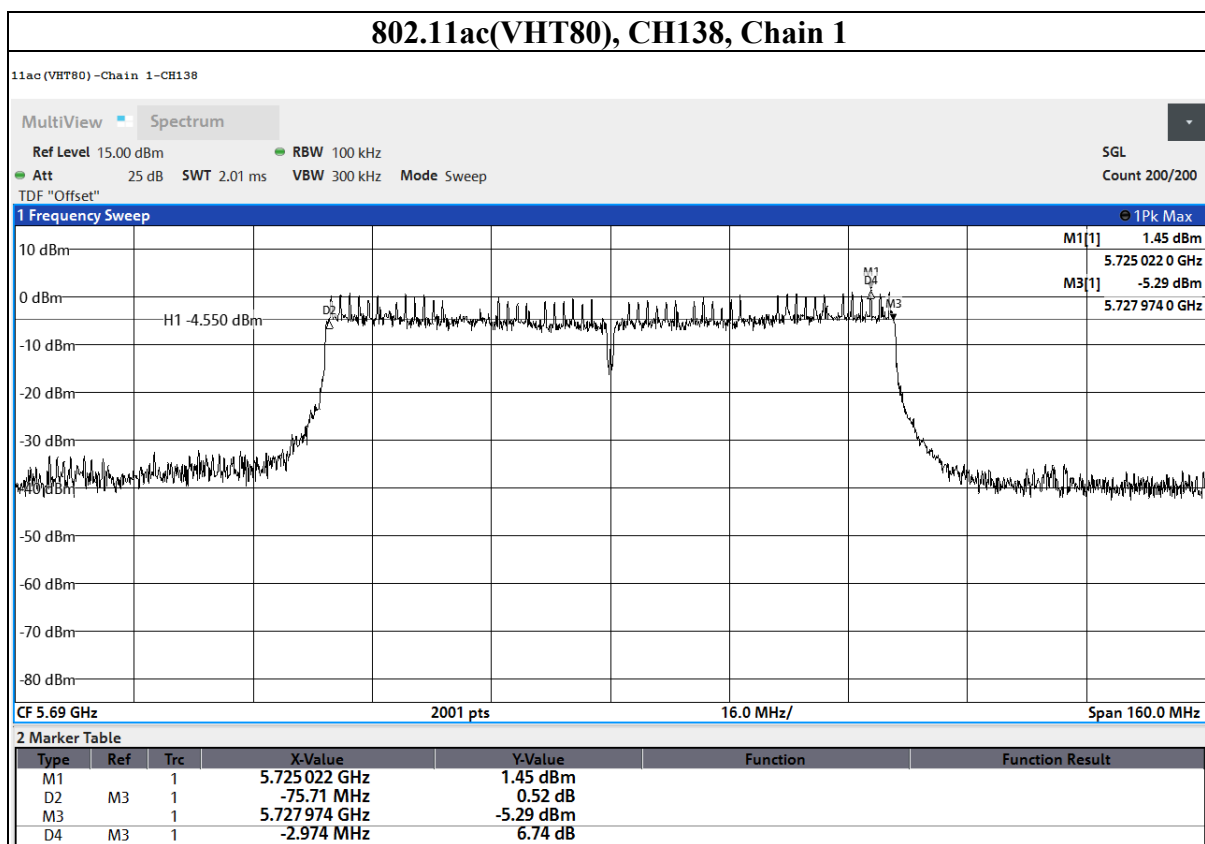
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

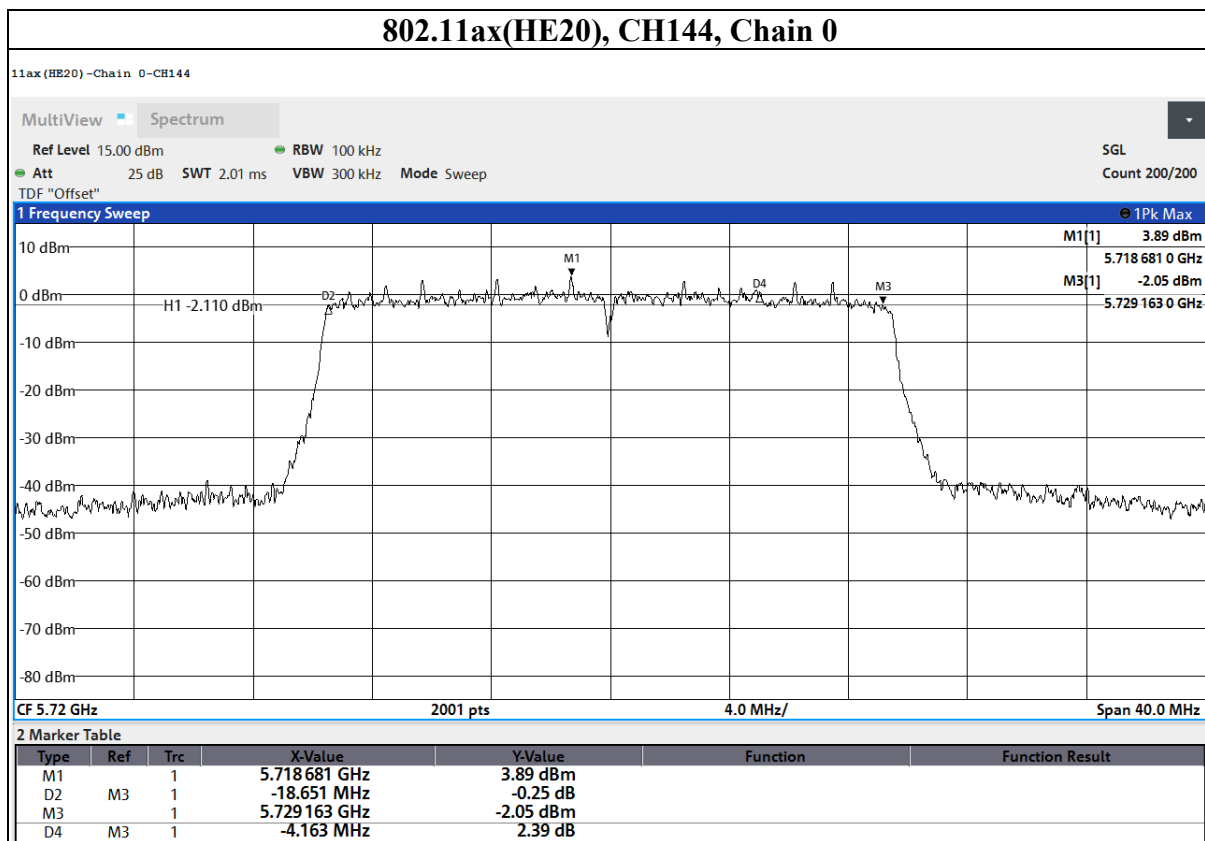
Facsimile (FAX) : +886-3-583-7948

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

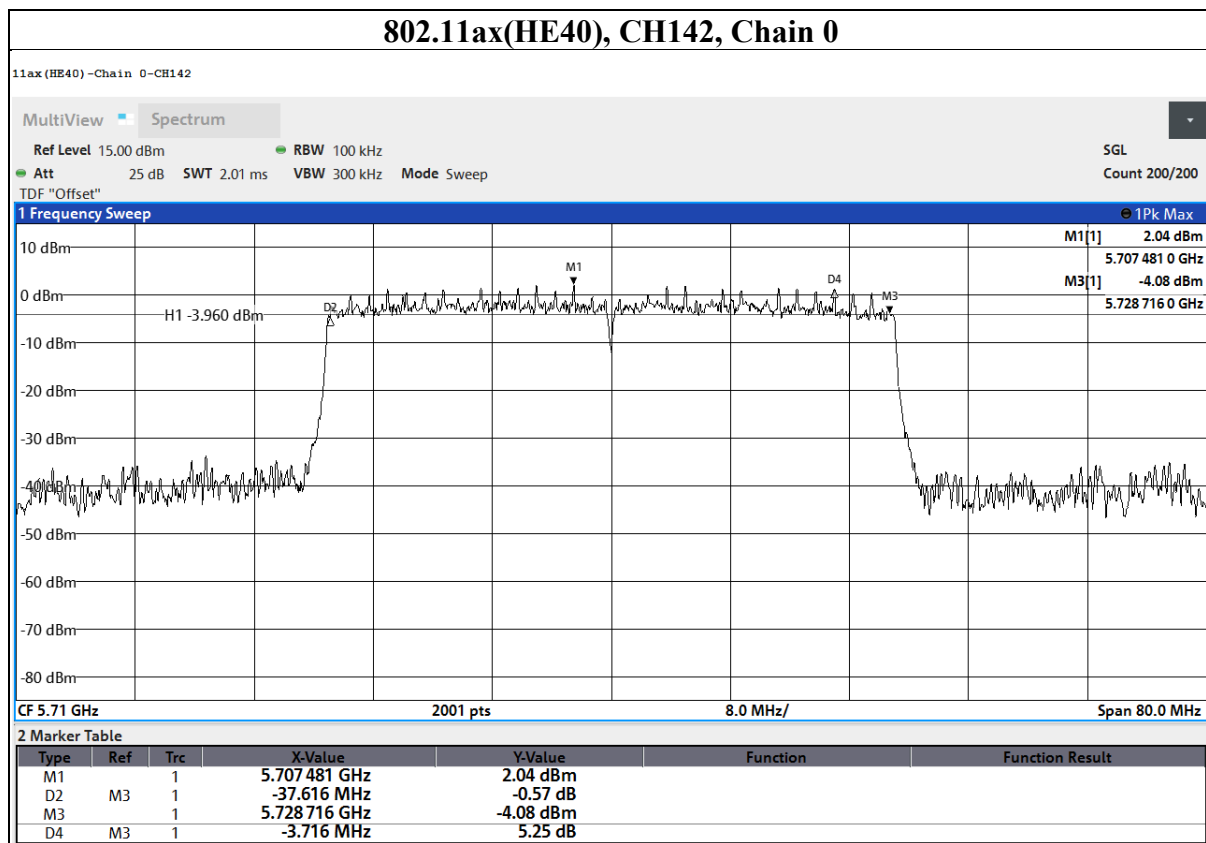
Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT80)	138 (U-NII-2C)	5690	73.202	72.736	0.5	PASS
	138 (U-NII-2C+U-NII-3)	5690	43.248	75.71	0.5	PASS
	138 (U-NII-3)	5690	29.954	2.974	0.5	PASS
	155	5775	75.82	76.361	0.5	PASS



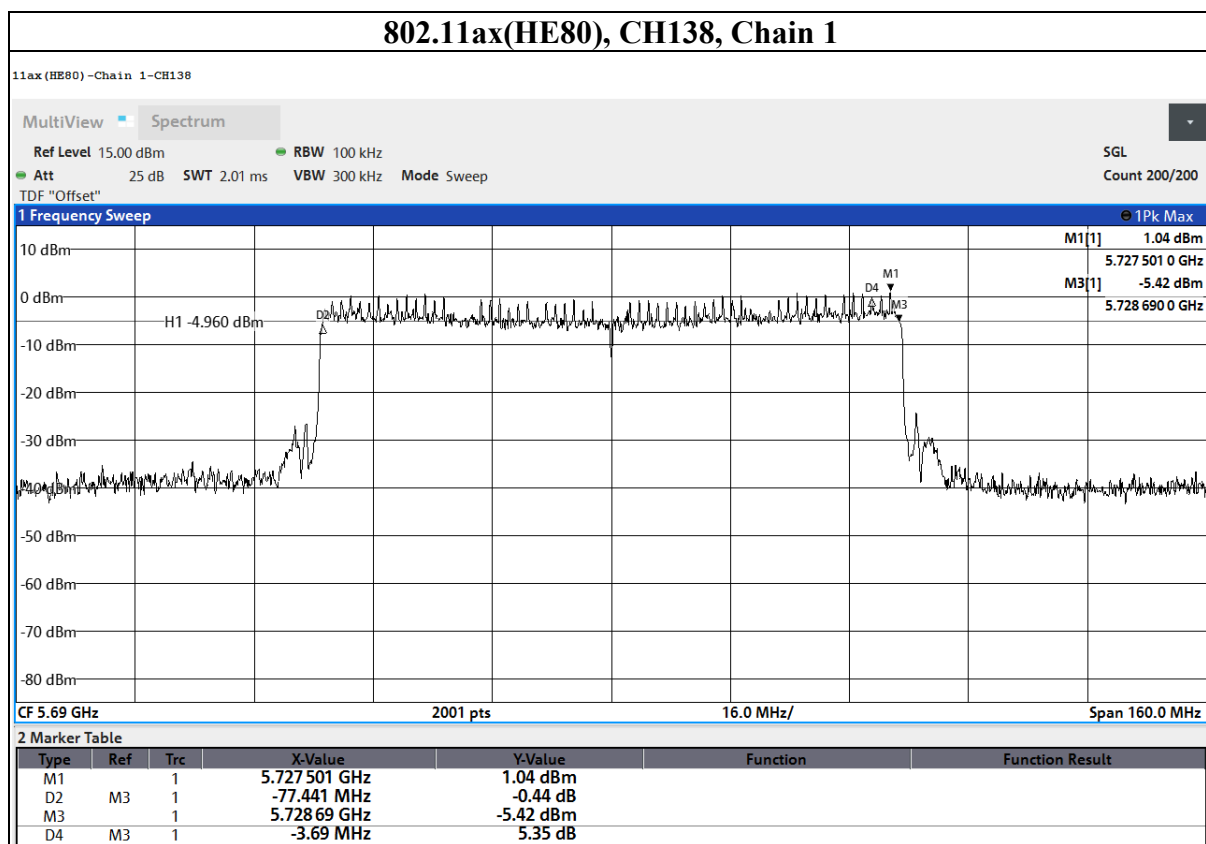
Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE20)	144 (U-NII-2C)	5720	14.488	14.503	0.5	PASS
	144 (U-NII-2C+U-NII-3)	5720	18.651	18.674	0.5	PASS
	144 (U-NII-3)	5720	4.163	4.171	0.5	PASS
	149	5745	18.39	18.249	0.5	PASS
	157	5785	18.261	18.232	0.5	PASS
	165	5825	18.27	18.332	0.5	PASS



Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE40)	142 (U-NII-2C)	5710	33.9	33.932	0.5	PASS
	142 (U-NII-2C+U-NII-3)	5710	37.616	37.789	0.5	PASS
	142 (U-NII-3)	5710	3.716	3.857	0.5	PASS
	151	5755	37.61	37.553	0.5	PASS
	159	5795	37.586	37.617	0.5	PASS



Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE80)	138 (U-NII-2C)	5690	73.906	73.751	0.5	PASS
	138 (U-NII-2C+U-NII-3)	5690	43.949	77.441	0.5	PASS
	138 (U-NII-3)	5690	29.957	3.69	0.5	PASS
	155	5775	77.718	47.507	0.5	PASS

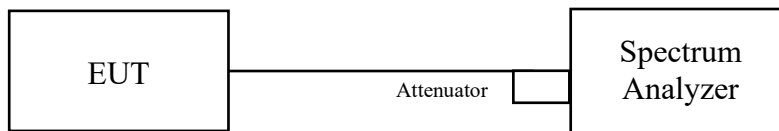


9.2. 26dB Bandwidth

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.

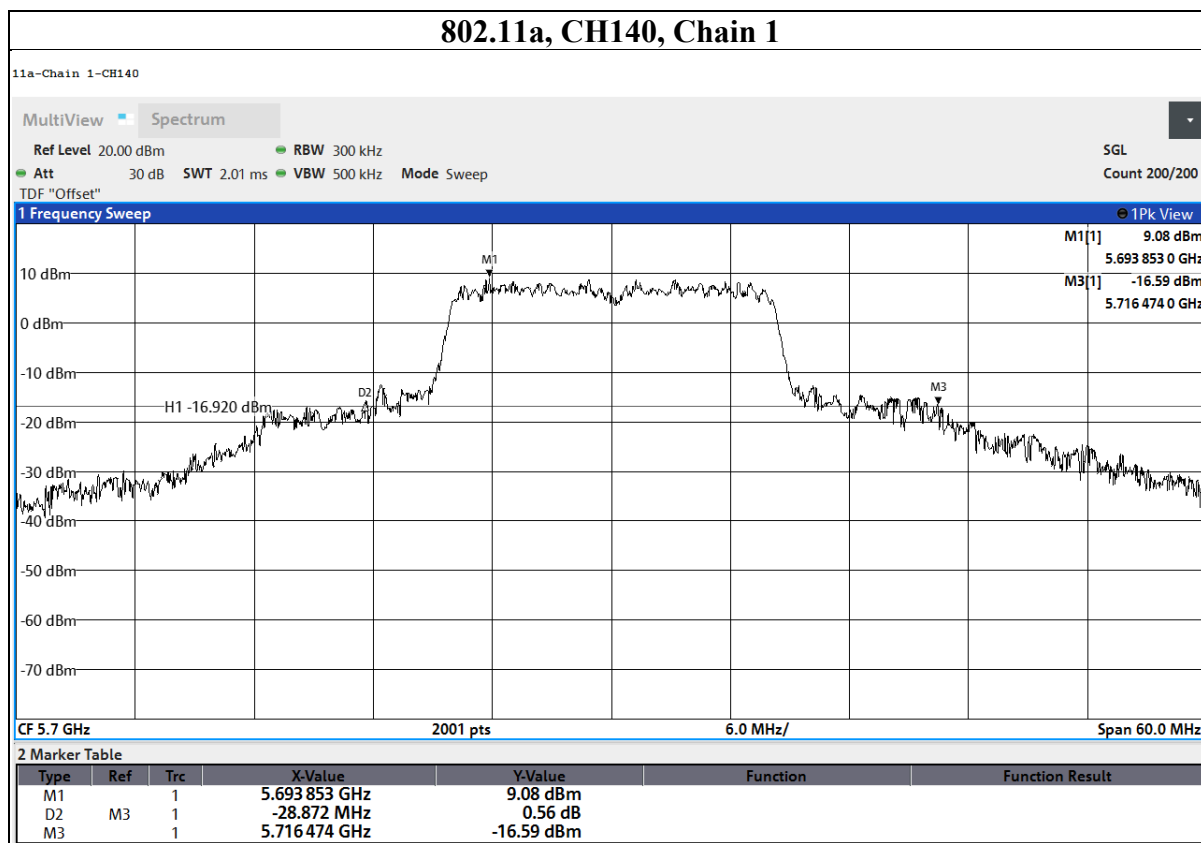
Test Setup



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	18.375	18.221	N/A	PASS
	44	5220	18.317	18.269	N/A	PASS
	48	5240	18.367	18.239	N/A	PASS
	52	5260	18.359	18.338	N/A	PASS
	60	5300	18.392	18.332	N/A	PASS
	64	5320	18.37	18.264	N/A	PASS
	100	5500	18.317	18.257	N/A	PASS
	116	5580	18.275	18.393	N/A	PASS
	140	5700	18.353	28.872	N/A	PASS
	144 (U-NII-2C)	5720	14.075	16.625	N/A	PASS
	144 (U-NII-2C+U-NII-3)	5720	18.352	23.987	N/A	PASS
	144 (U-NII-3)	5720	4.277	7.362	N/A	PASS



Underwriters Laboratories Taiwan Co., Ltd.

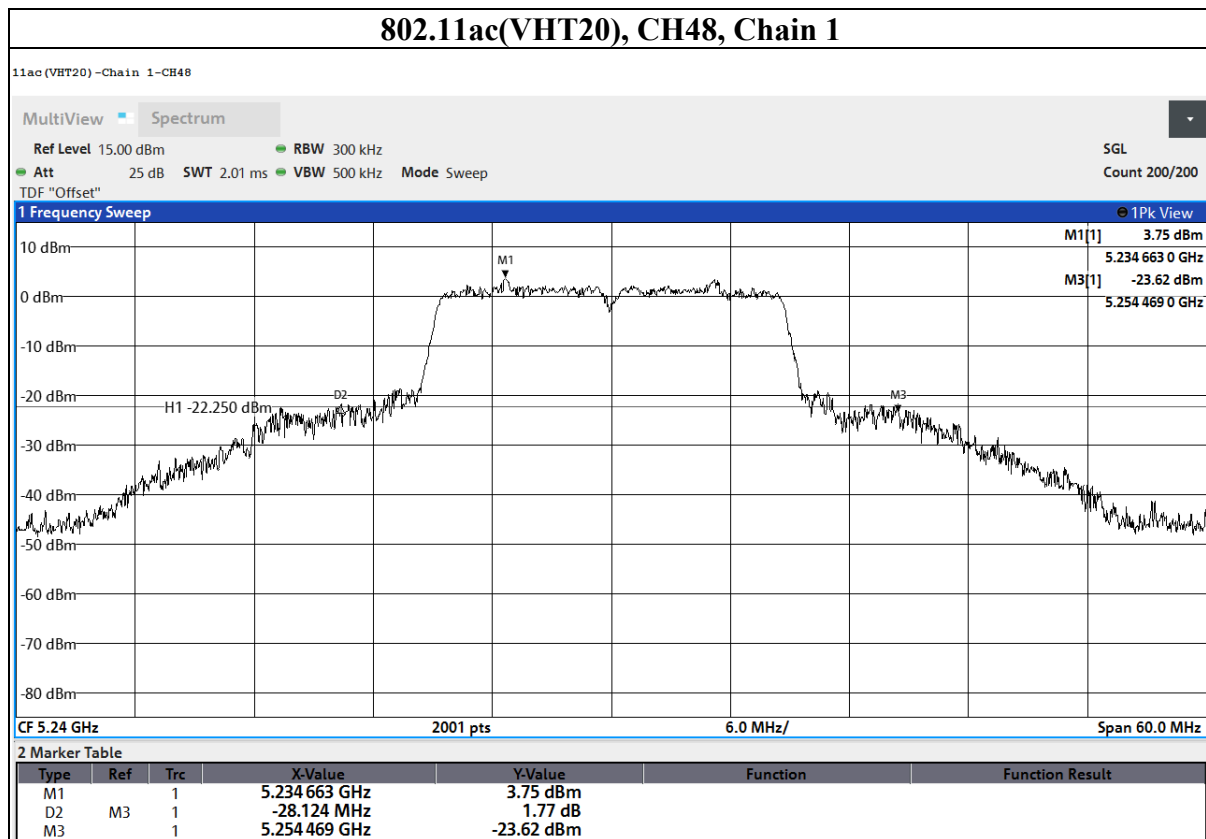
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

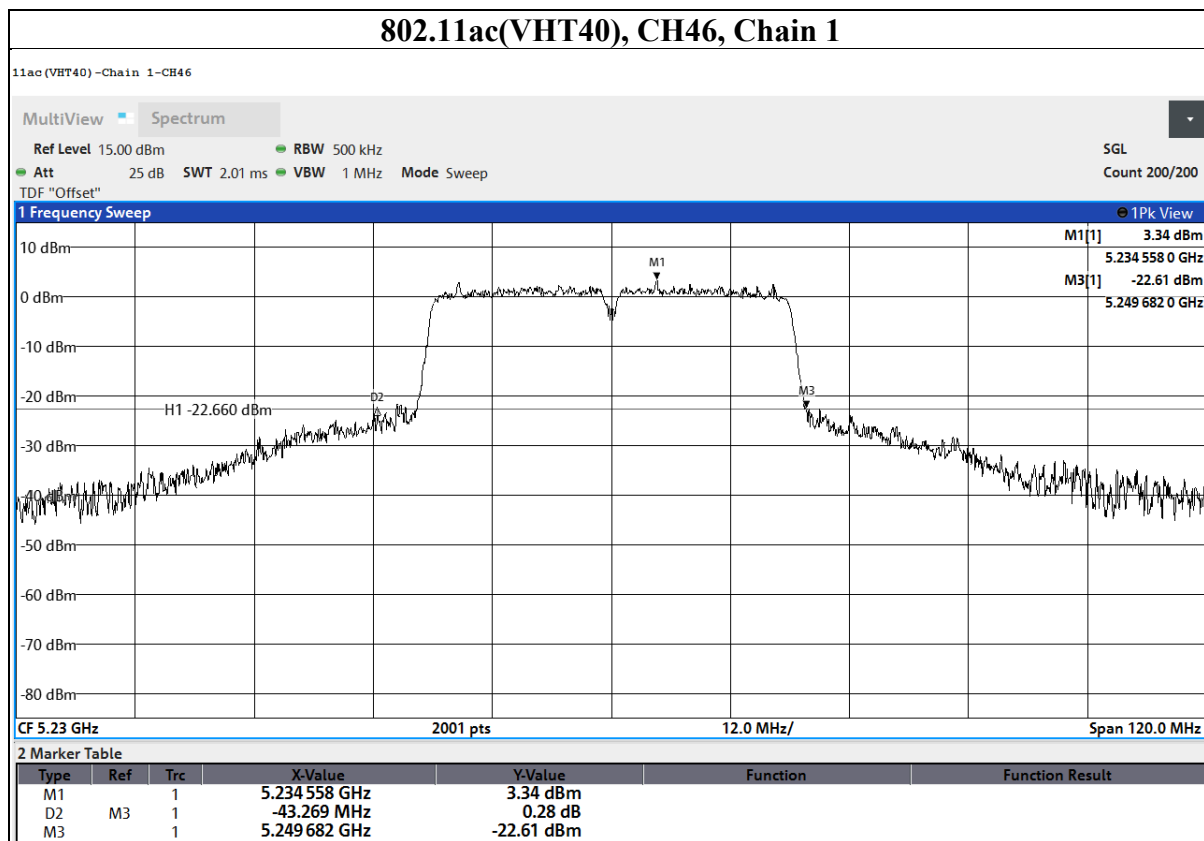
Facsimile (FAX) : +886-3-583-7948

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

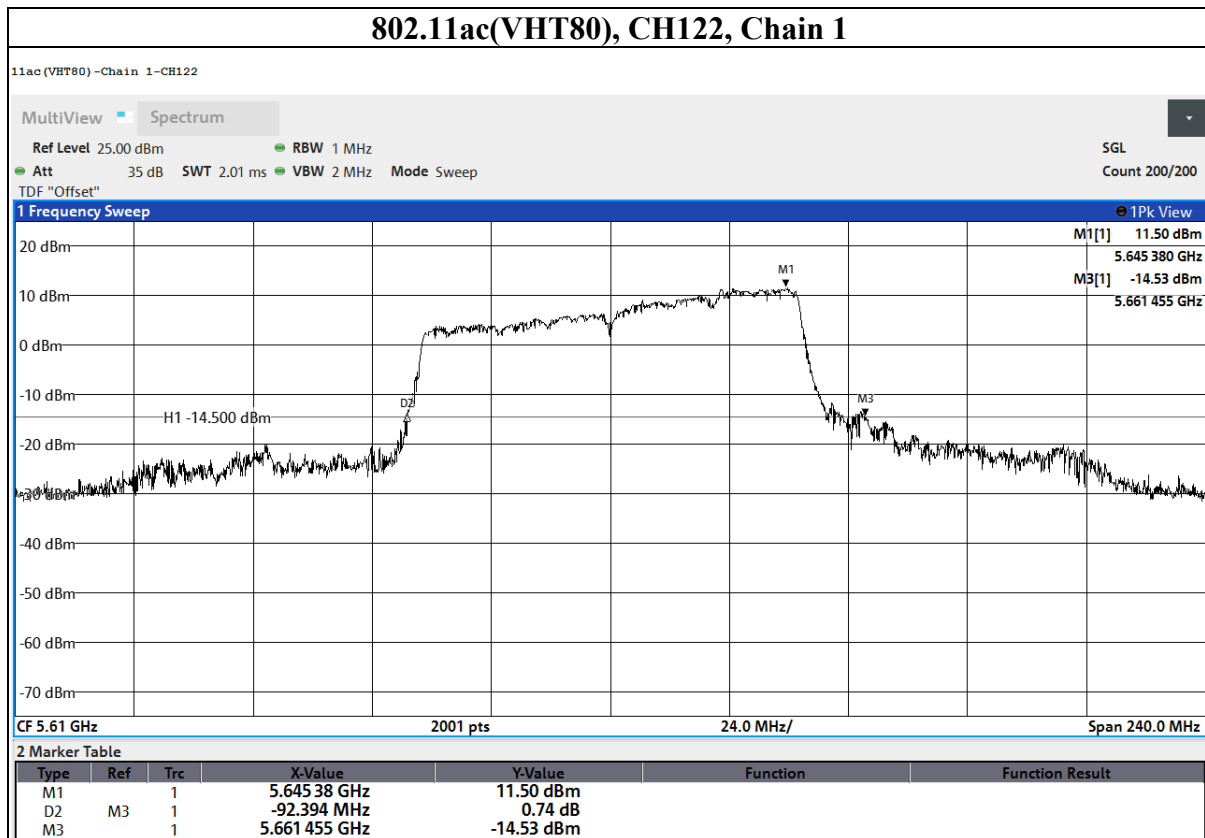
Mode	CH	Freq (MHz)	26dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT20)	36	5180	19.367	19.334	N/A	PASS
	44	5220	19.277	19.315	N/A	PASS
	48	5240	19.28	28.124	N/A	PASS
	52	5260	18.402	18.254	N/A	PASS
	60	5300	18.291	18.16	N/A	PASS
	64	5320	18.329	18.298	N/A	PASS
	100	5500	18.248	18.151	N/A	PASS
	116	5580	18.239	18.273	N/A	PASS
	140	5700	18.208	18.29	N/A	PASS
	144 (U-NII-2C)	5720	14.143	16.806	N/A	PASS
	144 (U-NII-2C+U-NII-3)	5720	18.279	23.061	N/A	PASS
	144 (U-NII-3)	5720	4.136	6.255	N/A	PASS



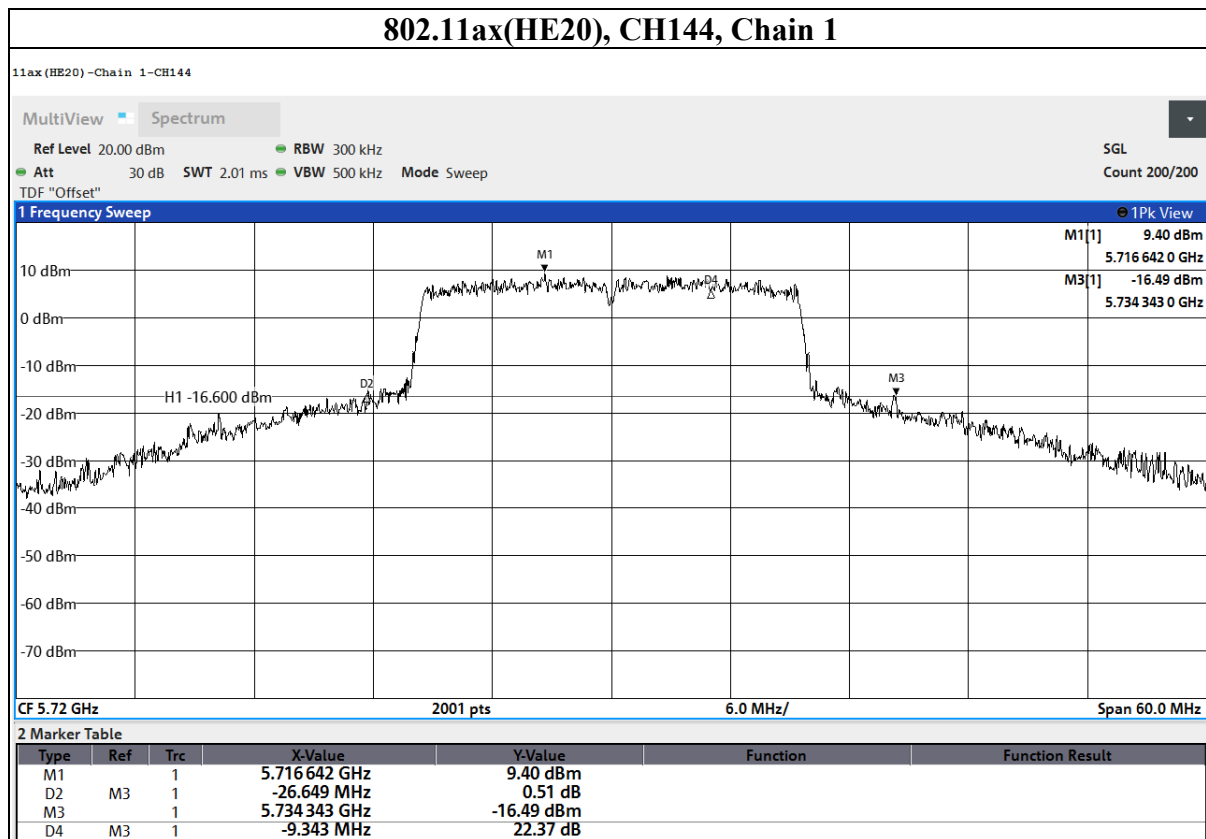
Mode	CH	Freq (MHz)	26dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT40)	38	5190	39.219	39.199	N/A	PASS
	46	5230	39.164	43.269	N/A	PASS
	54	5270	39.078	39.138	N/A	PASS
	62	5310	39.197	39.129	N/A	PASS
	102	5510	39.229	39.063	N/A	PASS
	110	5550	39.785	38.801	N/A	PASS
	134	5670	39.009	38.824	N/A	PASS
	142 (U-NII-2C)	5710	34.45	34.375	N/A	PASS
	142 (U-NII-2C+U-NII-3)	5710	38.988	38.925	N/A	PASS
	142 (U-NII-3)	5710	4.538	4.55	N/A	PASS



Mode	CH	Freq (MHz)	26dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT80)	42	5210	86.597	85.371	N/A	PASS
	58	5290	86.456	87.13	N/A	PASS
	106	5530	87.395	84.628	N/A	PASS
	122	5610	86.843	92.394	N/A	PASS
	138 (U-NII-2C)	5690	78.682	78.588	N/A	PASS
	138 (U-NII-2C+U-NII-3)	5690	84.484	87.184	N/A	PASS
	138 (U-NII-3)	5690	5.802	8.596	N/A	PASS



Mode	CH	Freq (MHz)	26dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE20)	36	5180	20.355	20.417	N/A	PASS
	44	5220	20.406	20.437	N/A	PASS
	48	5240	20.377	20.402	N/A	PASS
	52	5260	20.396	20.362	N/A	PASS
	60	5300	20.343	20.433	N/A	PASS
	64	5320	20.452	20.447	N/A	PASS
	100	5500	20.438	20.316	N/A	PASS
	116	5580	20.351	20.406	N/A	PASS
	140	5700	20.227	20.452	N/A	PASS
	144 (U-NII-2C)	5720	15.23	17.306	N/A	PASS
	144 (U-NII-2C+U-NII-3)	5720	20.467	26.649	N/A	PASS
	144 (U-NII-3)	5720	5.237	9.343	N/A	PASS



Underwriters Laboratories Taiwan Co., Ltd.

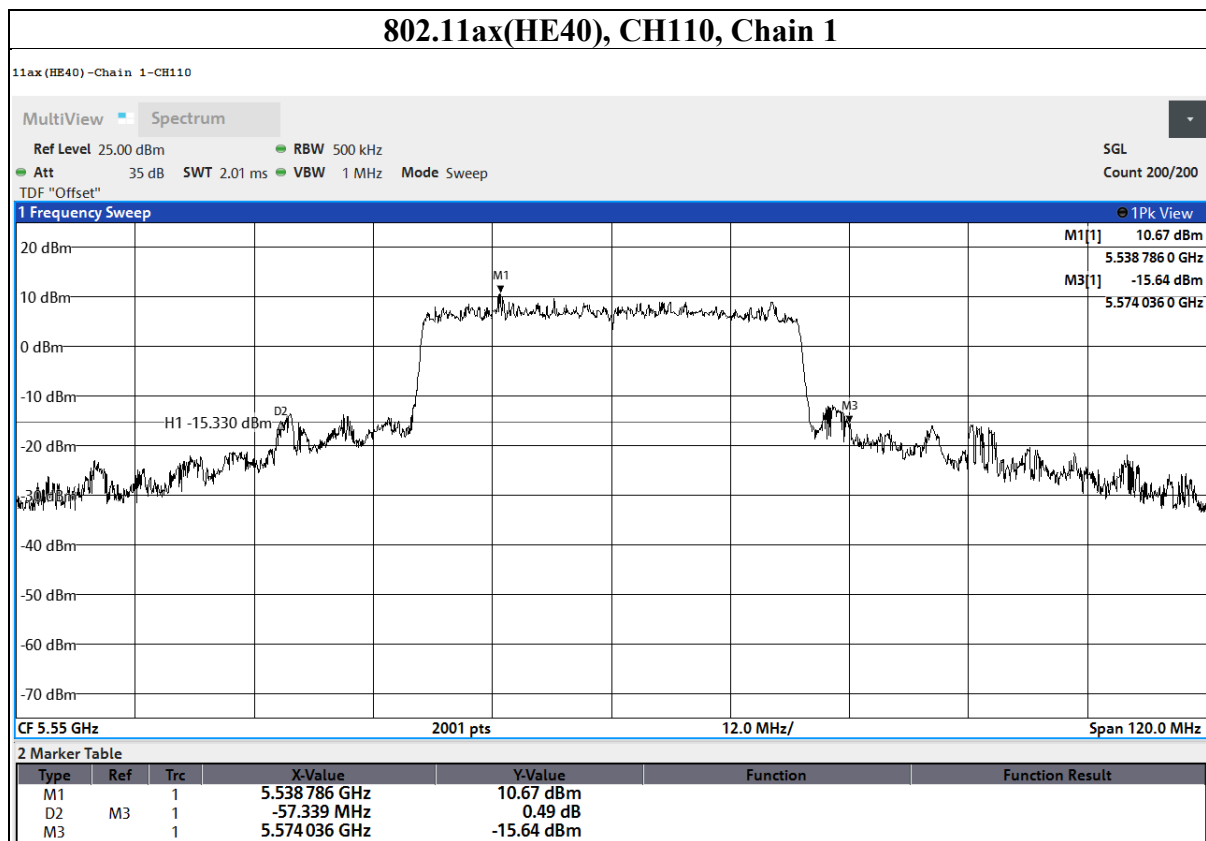
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

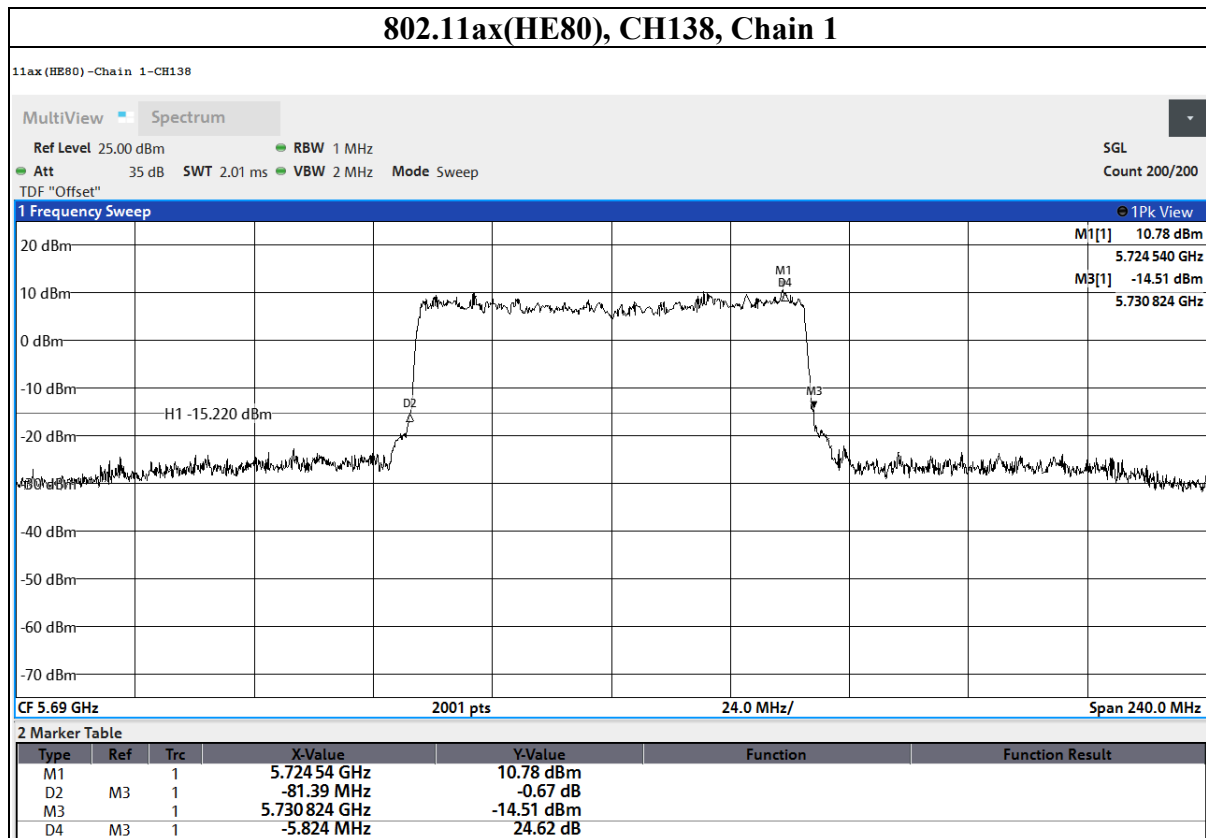
Facsimile (FAX) : +886-3-583-7948

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

Mode	CH	Freq (MHz)	26dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE40)	38	5190	40.046	39.78	N/A	PASS
	46	5230	40.126	45.358	N/A	PASS
	54	5270	39.907	40.065	N/A	PASS
	62	5310	39.958	40.011	N/A	PASS
	102	5510	40.021	40.052	N/A	PASS
	110	5550	40.092	57.339	N/A	PASS
	134	5670	40.031	39.791	N/A	PASS
	142 (U-NII-2C)	5710	34.969	35.06	N/A	PASS
	142 (U-NII-2C+U-NII-3)	5710	39.921	40.005	N/A	PASS
	142 (U-NII-3)	5710	4.952	4.945	N/A	PASS



Mode	CH	Freq (MHz)	26dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE80)	42	5210	81.019	81.117	N/A	PASS
	58	5290	81.078	80.809	N/A	PASS
	106	5530	81.027	80.742	N/A	PASS
	122	5610	81.251	80.335	N/A	PASS
	138 (U-NII-2C)	5690	75.825	75.566	N/A	PASS
	138 (U-NII-2C+U-NII-3)	5690	80.682	81.39	N/A	PASS
	138 (U-NII-3)	5690	4.857	5.824	N/A	PASS

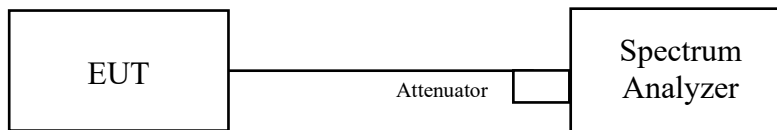


9.3. Occupied Bandwidth

Test procedure

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

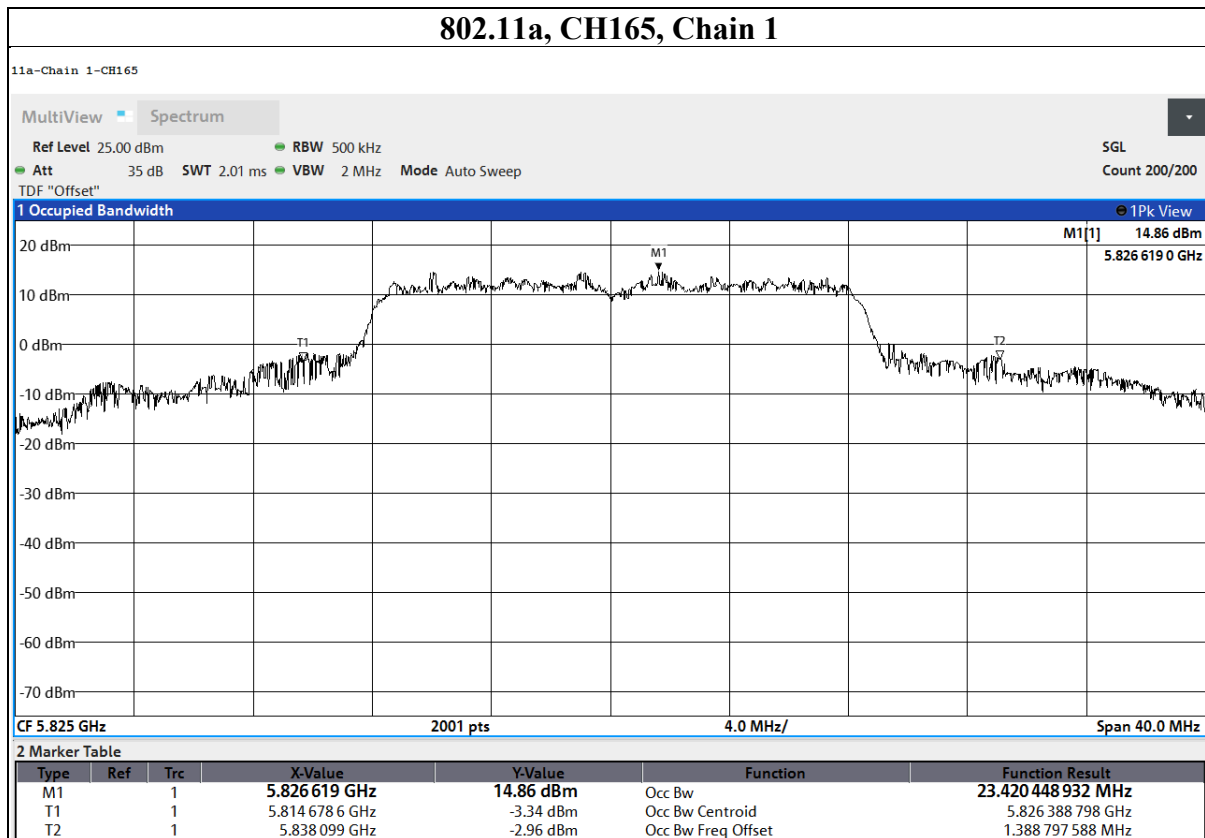
Test Setup



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	16.546	16.49	N/A	PASS
	44	5220	16.55	16.54	N/A	PASS
	48	5240	16.566	16.546	N/A	PASS
	52	5260	16.56	16.511	N/A	PASS
	60	5300	16.557	16.477	N/A	PASS
	64	5320	16.545	16.483	N/A	PASS
	100	5500	16.56	16.52	N/A	PASS
	116	5580	16.563	16.527	N/A	PASS
	140	5700	16.573	16.844	N/A	PASS
	144 (U-NII-2C)	5720	13.197	13.223	N/A	PASS
	144 (U-NII-2C+U-NII-3)	5720	16.585	16.668	N/A	PASS
	144 (U-NII-3)	5720	3.388	3.446	N/A	PASS
	149	5745	17.284	18.574	N/A	PASS
	157	5785	19.875	18.624	N/A	PASS
	165	5825	19.65	23.42	N/A	PASS



Underwriters Laboratories Taiwan Co., Ltd.

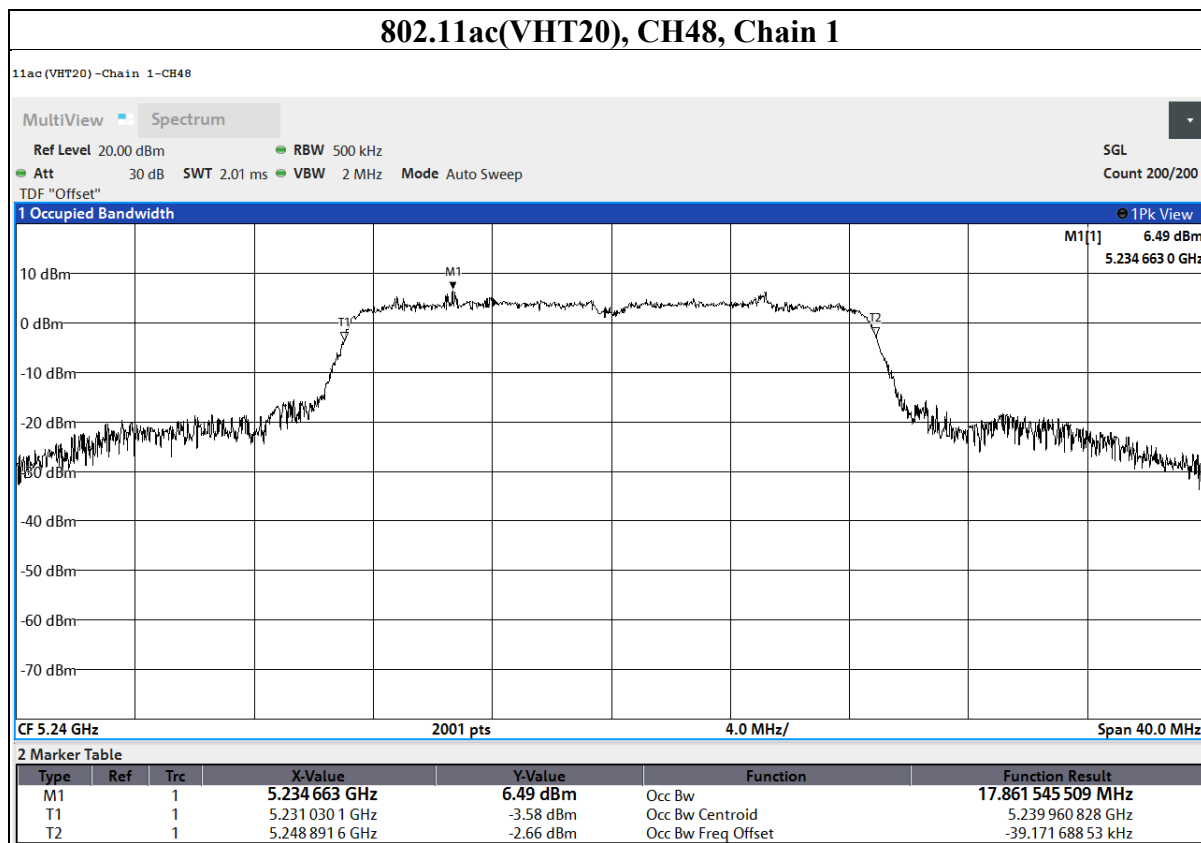
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

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

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

Mode	CH	Freq (MHz)	OBW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT20)	36	5180	17.657	17.652	N/A	PASS
	44	5220	17.664	17.699	N/A	PASS
	48	5240	17.644	17.862	N/A	PASS
	52	5260	16.625	16.474	N/A	PASS
	60	5300	16.561	16.489	N/A	PASS
	64	5320	16.568	16.485	N/A	PASS
	100	5500	16.579	16.507	N/A	PASS
	116	5580	16.578	16.501	N/A	PASS
	140	5700	16.575	16.512	N/A	PASS
	144 (U-NII-2C)	5720	13.302	13.34	N/A	PASS
	144 (U-NII-2C+U-NII-3)	5720	16.561	16.612	N/A	PASS
	144 (U-NII-3)	5720	3.259	3.272	N/A	PASS
	149	5745	17.147	16.941	N/A	PASS
	157	5785	16.982	16.753	N/A	PASS
	165	5825	16.962	16.722	N/A	PASS



Underwriters Laboratories Taiwan Co., Ltd.

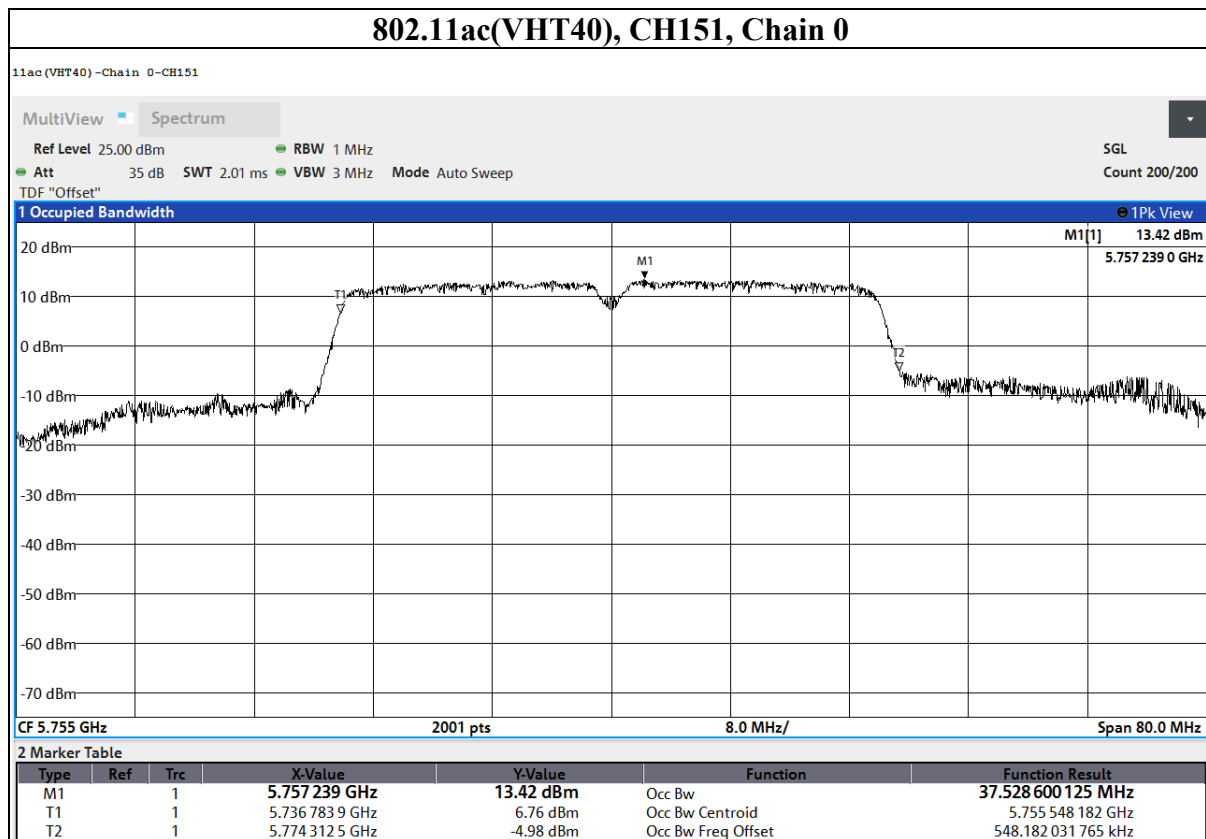
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

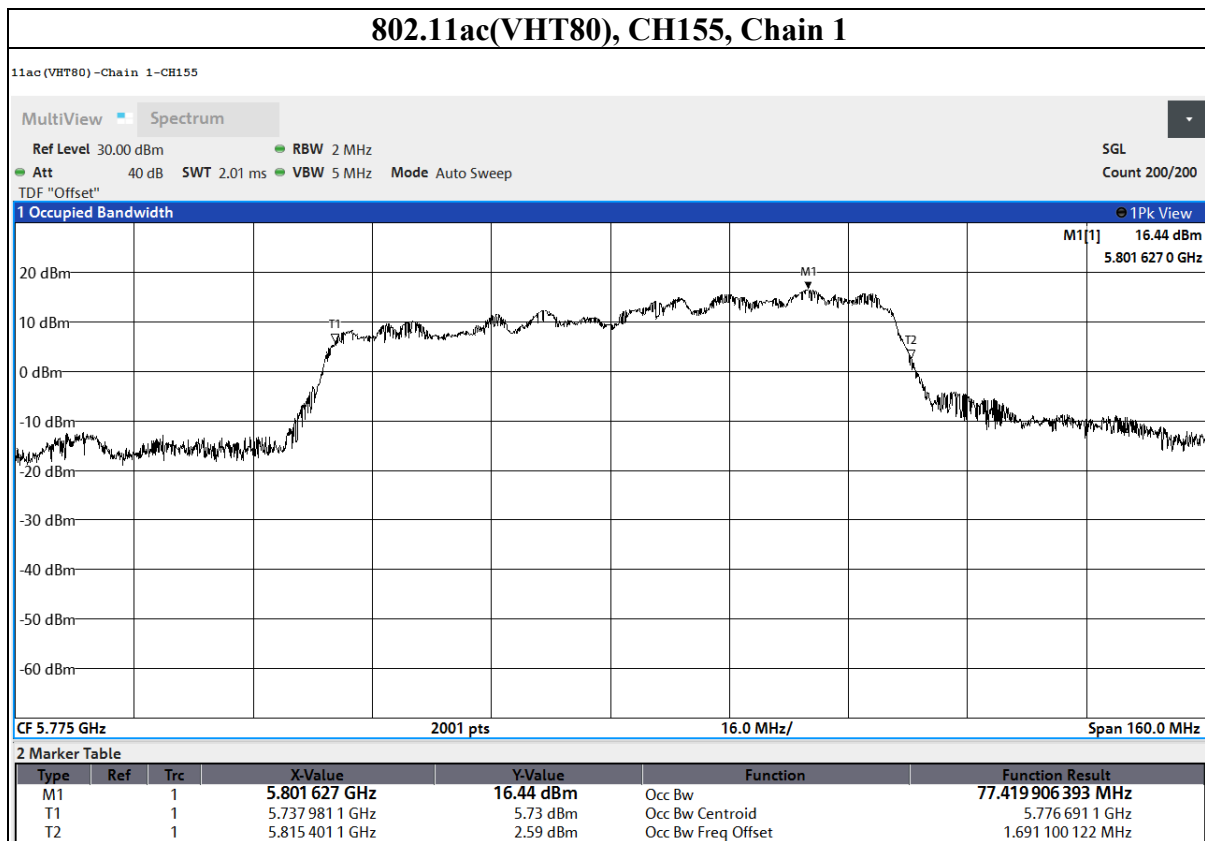
Facsimile (FAX) : +886-3-583-7948

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

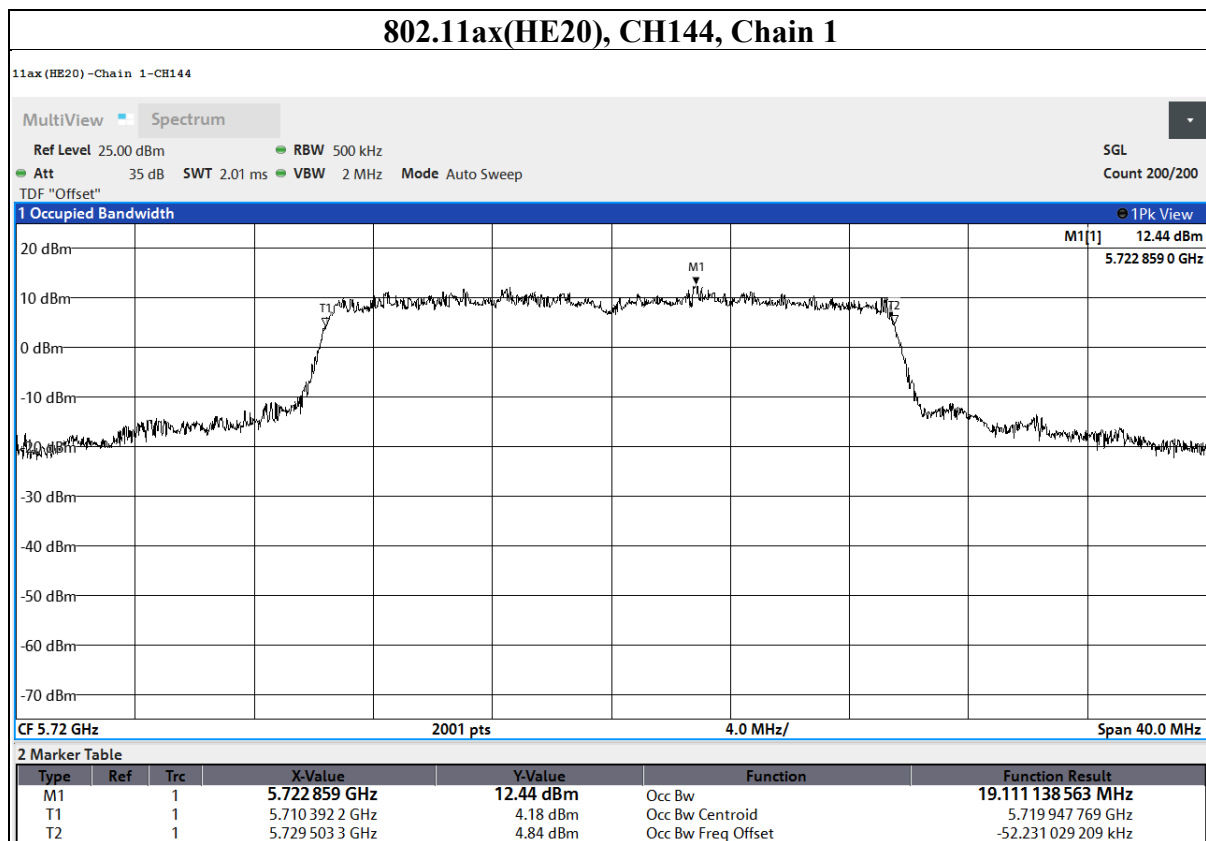
Mode	CH	Freq (MHz)	OBW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT40)	38	5190	36.057	36.064	N/A	PASS
	46	5230	36.059	36.214	N/A	PASS
	54	5270	36.071	36.08	N/A	PASS
	62	5310	36.055	36.048	N/A	PASS
	102	5510	36.062	36.084	N/A	PASS
	110	5550	36.244	36.136	N/A	PASS
	134	5670	36.097	36.146	N/A	PASS
	142 (U-NII-2C)	5710	33.079	33.053	N/A	PASS
	142 (U-NII-2C+U-NII-3)	5710	36.156	36.15	N/A	PASS
	142 (U-NII-3)	5710	3.077	3.097	N/A	PASS
	151	5755	37.529	36.586	N/A	PASS
	159	5795	36.632	36.564	N/A	PASS



Mode	CH	Freq (MHz)	OBW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT80)	42	5210	76.837	77.063	N/A	PASS
	58	5290	77.36	76.797	N/A	PASS
	106	5530	76.899	76.998	N/A	PASS
	122	5610	76.986	76.488	N/A	PASS
	138 (U-NII-2C)	5690	74.347	73.423	N/A	PASS
	138 (U-NII-2C+U-NII-3)	5690	75.676	76.926	N/A	PASS
	138 (U-NII-3)	5690	1.329	3.503	N/A	PASS
	155	5775	77.197	77.42	N/A	PASS



Mode	CH	Freq (MHz)	OBW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE20)	36	5180	18.985	18.973	N/A	PASS
	44	5220	18.959	18.995	N/A	PASS
	48	5240	18.963	19.01	N/A	PASS
	52	5260	18.938	19.001	N/A	PASS
	60	5300	18.975	18.971	N/A	PASS
	64	5320	18.993	18.962	N/A	PASS
	100	5500	18.991	18.997	N/A	PASS
	116	5580	18.983	18.996	N/A	PASS
	140	5700	18.986	18.953	N/A	PASS
	144 (U-NII-2C)	5720	14.532	14.608	N/A	PASS
	144 (U-NII-2C+U-NII-3)	5720	18.989	19.111	N/A	PASS
	144 (U-NII-3)	5720	4.457	4.503	N/A	PASS
	149	5745	19.107	19.104	N/A	PASS
	157	5785	19.063	19.087	N/A	PASS
	165	5825	19.077	19.066	N/A	PASS



Underwriters Laboratories Taiwan Co., Ltd.

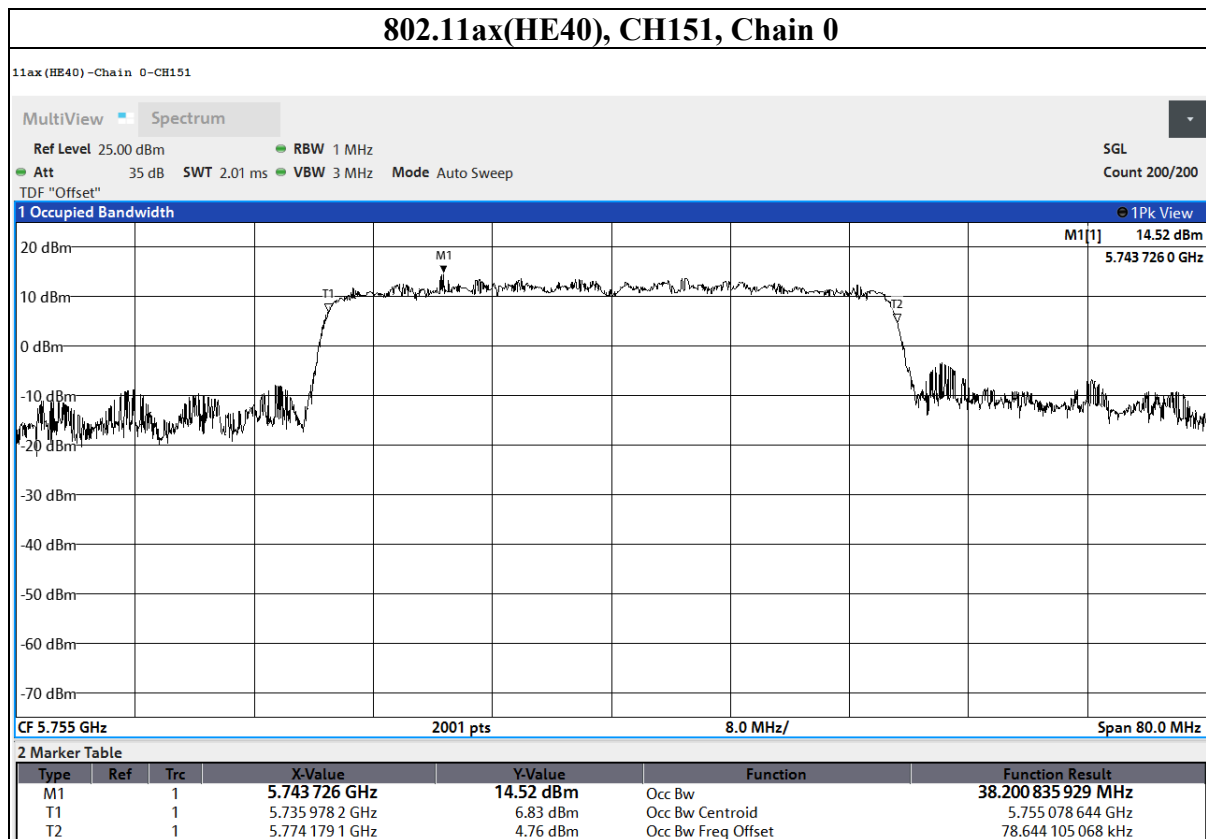
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

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

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

Mode	CH	Freq (MHz)	OBW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE40)	38	5190	37.721	37.785	N/A	PASS
	46	5230	37.724	37.96	N/A	PASS
	54	5270	37.755	37.789	N/A	PASS
	62	5310	37.733	37.761	N/A	PASS
	102	5510	37.745	37.806	N/A	PASS
	110	5550	37.764	38.182	N/A	PASS
	134	5670	37.798	37.866	N/A	PASS
	142 (U-NII-2C)	5710	33.96	33.95	N/A	PASS
	142 (U-NII-2C+U-NII-3)	5710	37.791	37.817	N/A	PASS
	142 (U-NII-3)	5710	3.831	3.867	N/A	PASS
	151	5755	38.201	38.065	N/A	PASS
	159	5795	37.925	37.878	N/A	PASS



Underwriters Laboratories Taiwan Co., Ltd.

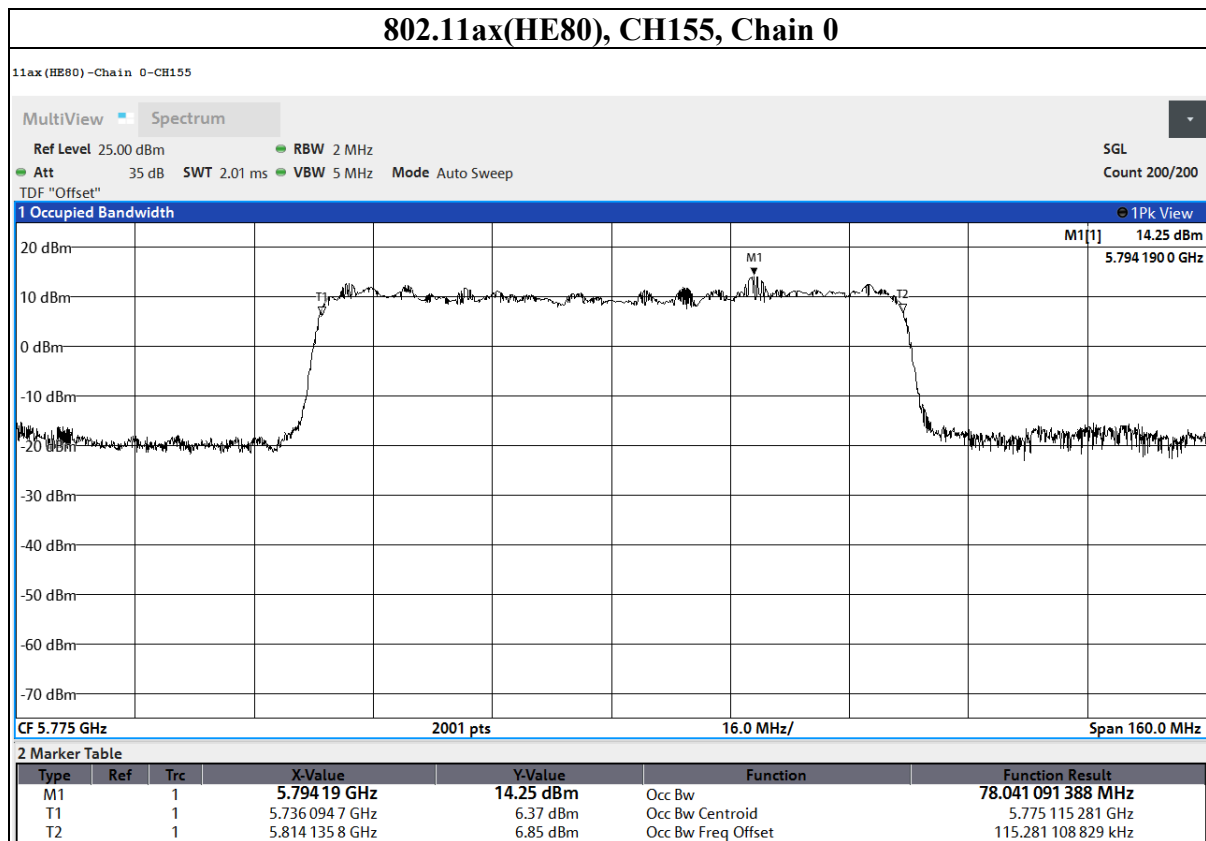
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

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

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

Mode	CH	Freq (MHz)	OBW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE80)	42	5210	77.919	77.993	N/A	PASS
	58	5290	77.904	76.844	N/A	PASS
	106	5530	77.955	77.726	N/A	PASS
	122	5610	77.965	77.26	N/A	PASS
	138 (U-NII-2C)	5690	74.37	73.914	N/A	PASS
	138 (U-NII-2C+U-NII-3)	5690	76.987	78.016	N/A	PASS
	138 (U-NII-3)	5690	2.616	4.102	N/A	PASS
	155	5775	78.041	77.962	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.
 N_{ant} : Number of Transmit Antennas
 $G1, G2, \dots, Gn$: 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

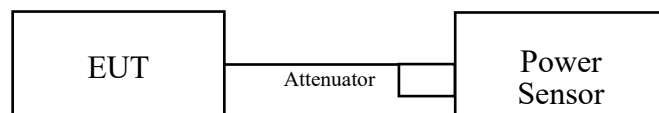
For Average Power Measurement

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.

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 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	9.46	10.7	20.559	13.13	23.93	19.18	30	Pass
	44	5220	9.28	9.81	18.03	12.56	23.93	18.61	30	Pass
	48	5240	9.43	9.77	18.239	12.61	23.93	18.66	30	Pass
	52	5260	13.03	13.97	45.082	16.54	23.58	22.59	30	Pass
	60	5300	13.66	13.76	46.989	16.72	23.58	22.77	30	Pass
	64	5320	13.61	13.77	46.774	16.7	23.56	22.75	30	Pass
	100	5500	16.44	16.93	93.325	19.7	23.56	25.75	30	Pass
	116	5580	15.93	17.25	92.257	19.65	23.56	25.7	30	Pass
	140	5700	15.74	17.02	87.902	19.44	23.58	25.49	30	Pass
	144	5720	15.742	16.68	84.14	19.25	23.58	25.3	30	Pass
	2c-144	5720	14.59	15.09	61.094	17.86	22.43	23.91	30	Pass
	3-144	5720	9.42	11.55	23.014	13.62	29.95	19.67	36.02	Pass
	149	5745	21.5	22.4	314.775	24.98	29.95	31.03	36.02	Pass
	157	5785	21.69	22.58	328.852	25.17	29.95	31.22	36.02	Pass
	165	5825	21.15	22.37	302.691	24.81	29.95	30.86	36.02	Pass
802.11ac(VHT20)	36	5180	9.36	9.98	18.578	12.69	23.93	18.74	30	Pass
	44	5220	9.18	9.65	17.498	12.43	23.93	18.48	30	Pass
	48	5240	9.32	9.81	18.113	12.58	23.93	18.63	30	Pass
	52	5260	13.56	13.62	45.709	16.6	23.56	22.65	30	Pass
	60	5300	13.51	13.52	44.978	16.53	23.54	22.58	30	Pass
	64	5320	13.5	13.61	45.394	16.57	23.57	22.62	30	Pass
	100	5500	16.04	16.52	85.114	19.3	23.53	25.35	30	Pass
	116	5580	15.42	16.81	82.794	19.18	23.56	25.23	30	Pass
	140	5700	15.08	16.66	78.524	18.95	23.55	25	30	Pass
	144	5720	15.29	16.85	82.224	19.15	23.56	25.2	30	Pass
	2c-144	5720	14.18	15.48	61.518	17.89	22.45	23.94	30	Pass
	3-144	5720	8.84	11.18	20.797	13.18	29.95	19.23	36.02	Pass
	149	5745	19.73	20.63	209.411	23.21	29.95	29.26	36.02	Pass
	157	5785	20.01	20.12	203.236	23.08	29.95	29.13	36.02	Pass
	165	5825	19.52	19.82	185.353	22.68	29.95	28.73	36.02	Pass
802.11ac(VHT40)	38	5190	12.45	13.35	39.174	15.93	23.93	21.98	30	Pass
	46	5230	12.03	12.73	34.674	15.40	23.93	21.45	30	Pass
	54	5270	13.41	13.95	46.774	16.70	23.93	22.75	26.99	Pass
	62	5310	13.55	14.03	47.973	16.81	23.93	22.86	26.99	Pass
	102	5510	15.12	15.59	68.707	18.37	23.93	24.42	26.99	Pass
	110	5550	16.92	18.05	112.98	20.53	23.93	26.58	26.99	Pass
	134	5670	16.84	18.15	113.501	20.55	23.93	26.60	26.99	Pass
	142	5710	16.71	18.14	111.944	20.49	23.93	26.54	26.99	Pass
	2c-142	5710	16.17	17.61	99.083	19.96	23.93	26.01	26.99	Pass
	3-142	5710	7.39	8.77	13.002	11.14	29.95	17.19	36.02	Pass
	151	5755	20.05	21.75	250.611	23.99	29.95	30.04	36.02	Pass
	159	5795	19.85	21.71	244.906	23.89	29.95	29.94	36.02	Pass
802.11ac(VHT80)	42	5210	13.01	13.61	42.954	16.33	23.93	22.38	30	Pass
	58	5290	13.41	14.15	47.973	16.81	23.93	22.86	26.99	Pass
	106	5530	14.49	14.99	59.704	17.76	23.93	23.81	26.99	Pass
	122	5610	16.64	18.37	114.815	20.60	23.93	26.65	26.99	Pass
	138	5690	16.71	17.81	107.399	20.31	23.93	26.36	26.99	Pass
	2c-138	5690	16.24	17.58	99.312	19.97	23.93	26.02	26.99	Pass
	3-138	5690	6.79	4.95	7.907	8.98	29.95	15.03	36.02	Pass
	155	5775	18.40	19.88	166.341	22.21	29.95	28.26	36.02	Pass

Mode	CH	Freq. (MHz)	AVG Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)	Result
			Chain0	Chain1						
802.11ax(HE20)	36	5180	9.47	10.8	20.893	13.2	23.93	19.25	30	Pass
	44	5220	9.29	9.75	17.947	12.54	23.93	18.59	30	Pass
	48	5240	9.37	9.83	18.281	12.62	23.93	18.67	30	Pass
	52	5260	13.19	13.71	44.361	16.47	23.93	22.52	30	Pass
	60	5300	13.67	13.73	46.881	16.71	23.93	22.76	30	Pass
	64	5320	13.59	13.67	46.132	16.64	23.93	22.69	30	Pass
	100	5500	16.1	17.5	97.051	19.87	23.93	25.92	30	Pass
	116	5580	16.12	17.49	97.051	19.87	23.93	25.92	30	Pass
	140	5700	15.78	16.7	84.528	19.27	23.93	25.32	30	Pass
	144	5720	15.73	16.74	84.528	19.27	23.93	25.32	30	Pass
	2c-144	5720	14.45	14.87	58.614	17.68	22.77	23.73	30	Pass
	3-144	5720	9.81	12.19	26.122	14.17	29.95	20.22	36.02	Pass
	149	5745	20.5	21.2	243.781	23.87	29.95	29.92	36.02	Pass
	157	5785	21.11	22.15	293.089	24.67	29.95	30.72	36.02	Pass
	165	5825	21.16	22.21	297.167	24.73	29.95	30.78	36.02	Pass
802.11ax(HE40)	38	5190	12.61	13.49	40.551	16.08	23.93	22.13	30	Pass
	46	5230	12.48	13.17	38.459	15.85	23.93	21.90	30	Pass
	54	5270	13.05	13.96	45.082	16.54	23.93	22.59	26.99	Pass
	62	5310	13.22	13.78	44.875	16.52	23.93	22.57	26.99	Pass
	102	5510	14.72	15.55	65.615	18.17	23.93	24.22	26.99	Pass
	110	5550	16.75	17.96	109.901	20.41	23.93	26.46	26.99	Pass
	134	5670	16.94	18.27	116.681	20.67	23.93	26.72	26.99	Pass
	142	5710	16.70	18.12	111.686	20.48	23.93	26.53	26.99	Pass
	2c-142	5710	16.12	17.53	97.499	19.89	23.93	25.94	26.99	Pass
	3-142	5710	7.70	9.16	14.125	11.50	29.95	17.55	36.02	Pass
	151	5755	21.05	22.50	305.492	24.85	29.95	30.90	36.02	Pass
802.11ax(HE80)	159	5795	21.03	22.49	304.089	24.83	29.95	30.88	36.02	Pass
	42	5210	13.41	13.94	46.666	16.69	23.93	22.74	30	Pass
	58	5290	13.48	14.03	47.534	16.77	23.93	22.82	26.99	Pass
	106	5530	14.61	15.14	61.518	17.89	23.93	23.94	26.99	Pass
	122	5610	16.91	18.58	121.339	20.84	23.93	26.89	26.99	Pass
	138	5690	17.04	18.01	113.763	20.56	23.93	26.61	26.99	Pass
	2c-138	5690	16.74	17.73	106.414	20.27	23.93	26.32	26.99	Pass
	3-138	5690	5.34	5.89	7.295	8.63	29.95	14.68	36.02	Pass
	155	5775	19.93	21.84	251.189	24.00	29.95	30.05	36.02	Pass

Note: Record the total power of the CH144* value for reference purposes.

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%)
5. Directional Gain calculation method uses Gain (Max) + $10 * \log(N) = 5.53 + 3.01 = 8.54$ dBi

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 procedure

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

Using method as below:

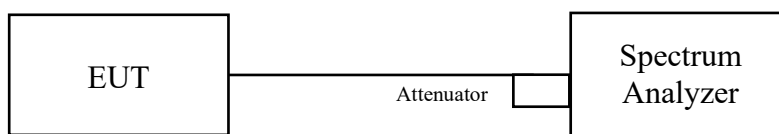
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 1 MHz, Set VBW $\geq$ 3 RBW, Detector = RMS
- Sweep time = auto, trigger set to “free run”.
- Trace average at least 100 traces in power averaging mode.
- Record the max value. (if Duty cycle <98 %, add 10 log (1/duty 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 $BWCF = 10 \log (500 \text{ kHz}/300\text{kHz})$
- 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

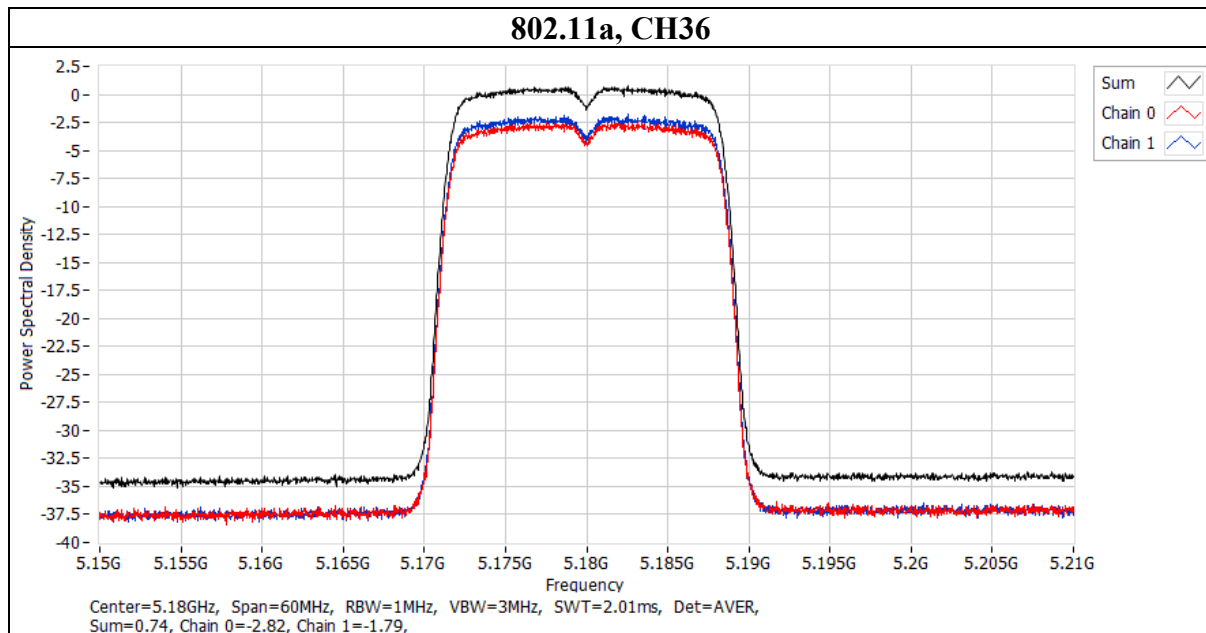
Facsimile (FAX) : +886-3-583-7948

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

Test Data

Mode (U-NII-1)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11a	36	5180	9.06	0.74	7.94	PASS
	44	5220	9.06	0.42	7.94	PASS
	48	5240	9.06	0.48	7.94	PASS

Mode (U-NII-1)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11a	36	5180	-2.51	-1.79
	44	5220	-2.77	-2.08
	48	5240	-2.61	-2.12



Underwriters Laboratories Taiwan Co., Ltd.

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

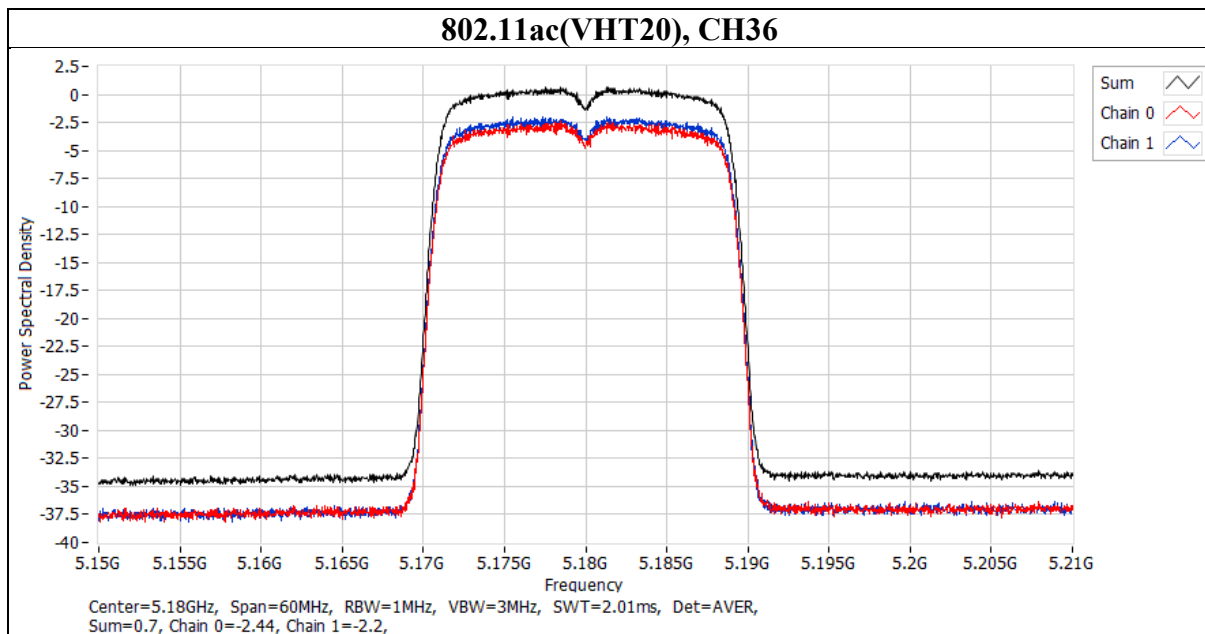
Telephone : +886-2-7737-3000

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

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

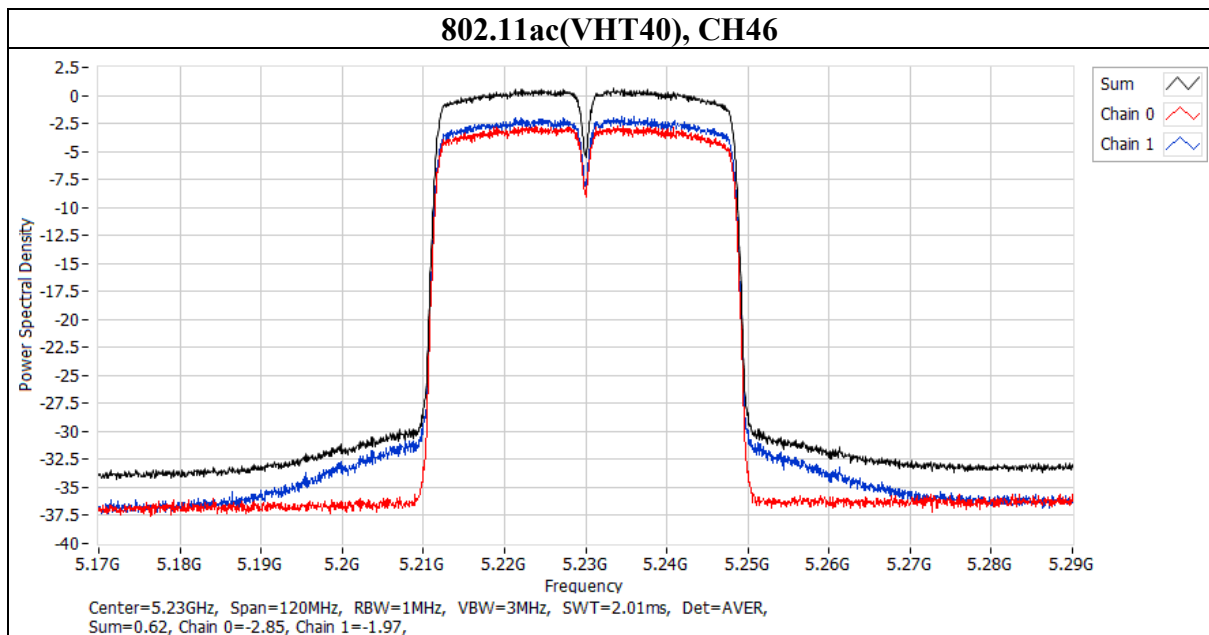
Mode (U-NII-1)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ac(VHT20)	36	5180	9.06	0.7	7.94	PASS
	44	5220	9.06	0.33	7.94	PASS
	48	5240	9.06	0.51	7.94	PASS

Mode (U-NII-1)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ac(VHT20)	36	5180	-2.35	-1.98
	44	5220	-2.83	-2.31
	48	5240	-2.56	-2.11



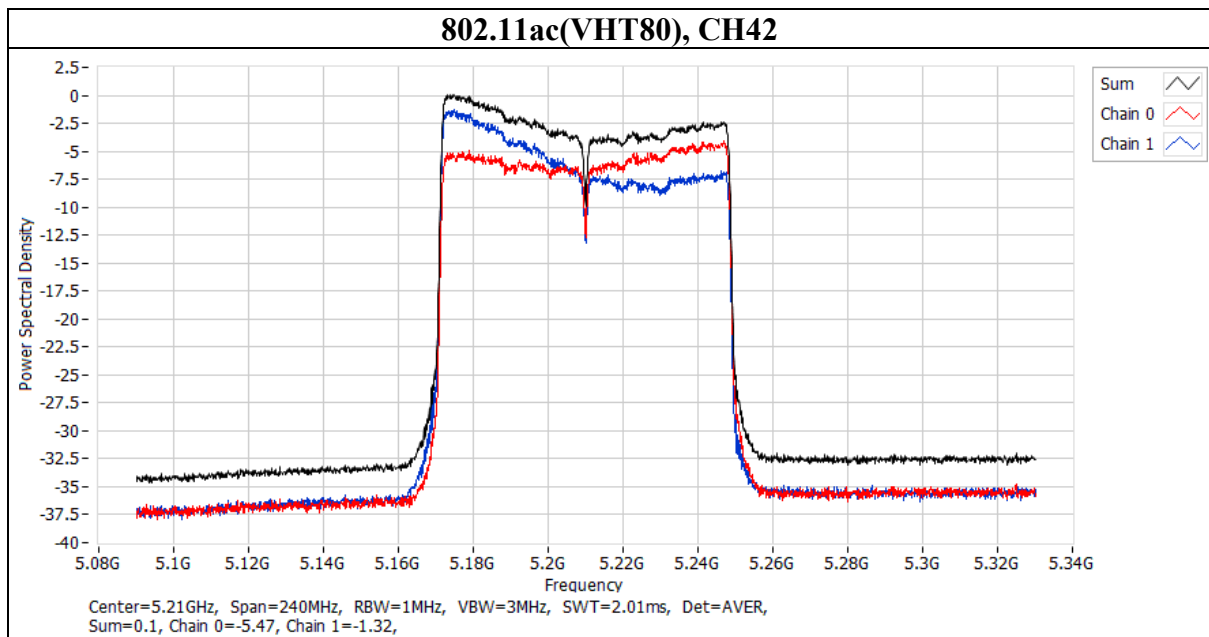
Mode (U-NII-1)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ac(VHT40)	38	5190	9.06	0.3	7.94	PASS
	46	5230	9.06	0.62	7.94	PASS

Mode (U-NII-1)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ac(VHT40)	38	5190	-2.92	-2.32
	46	5230	-2.69	-1.92



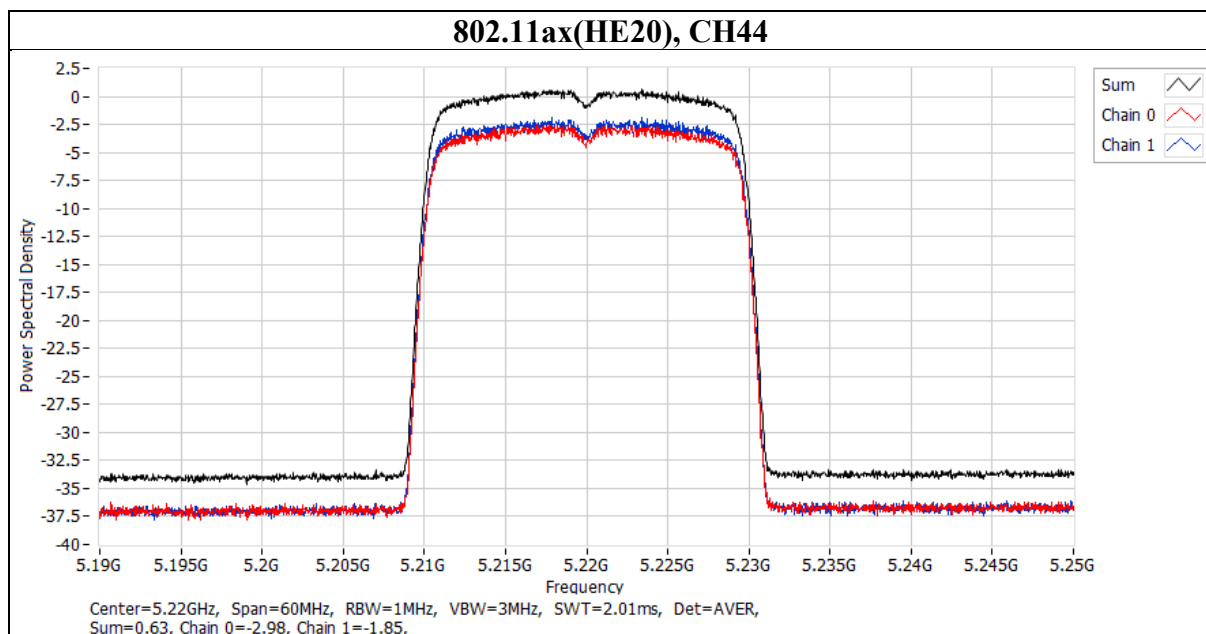
Mode (U-NII-1)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ac(VHT80)	42	5210	9.06	0.1	7.94	PASS

Mode (U-NII-1)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ac(VHT80)	42	5210	-4.12	-1.32



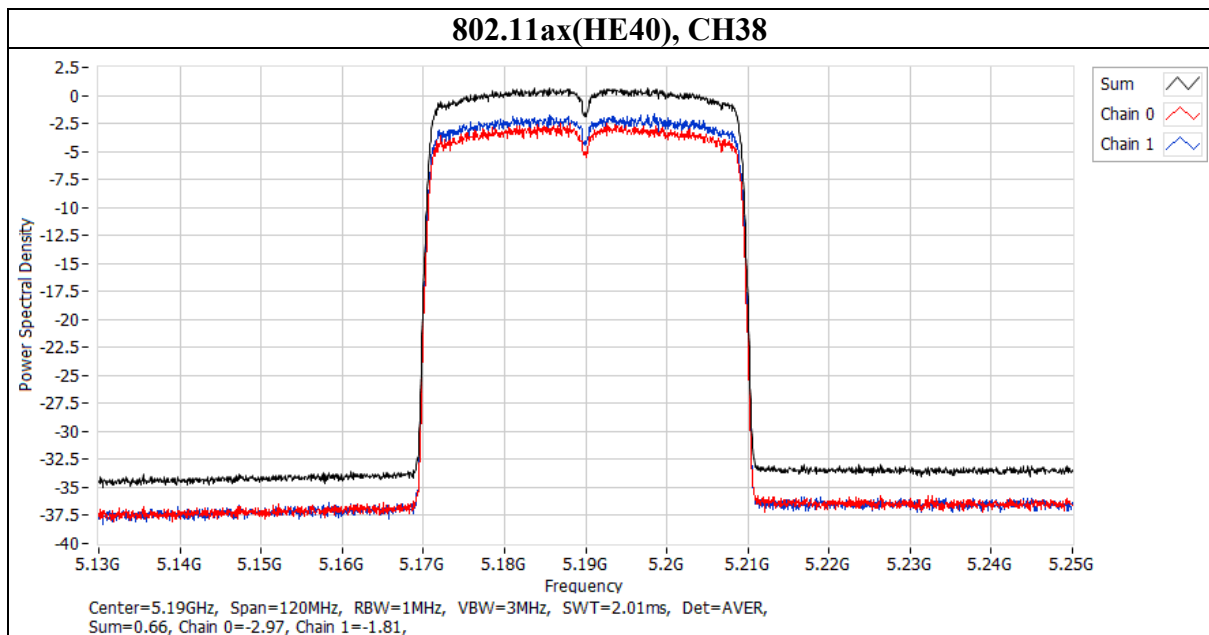
Mode (U-NII-1)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ax(HE20)	36	5180	9.06	0.36	7.94	PASS
	44	5220	9.06	0.63	7.94	PASS
	48	5240	9.06	0.24	7.94	PASS

Mode (U-NII-1)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ax(HE20)	36	5180	-2.85	-2.17
	44	5220	-2.48	-1.85
	48	5240	-2.86	-2.52



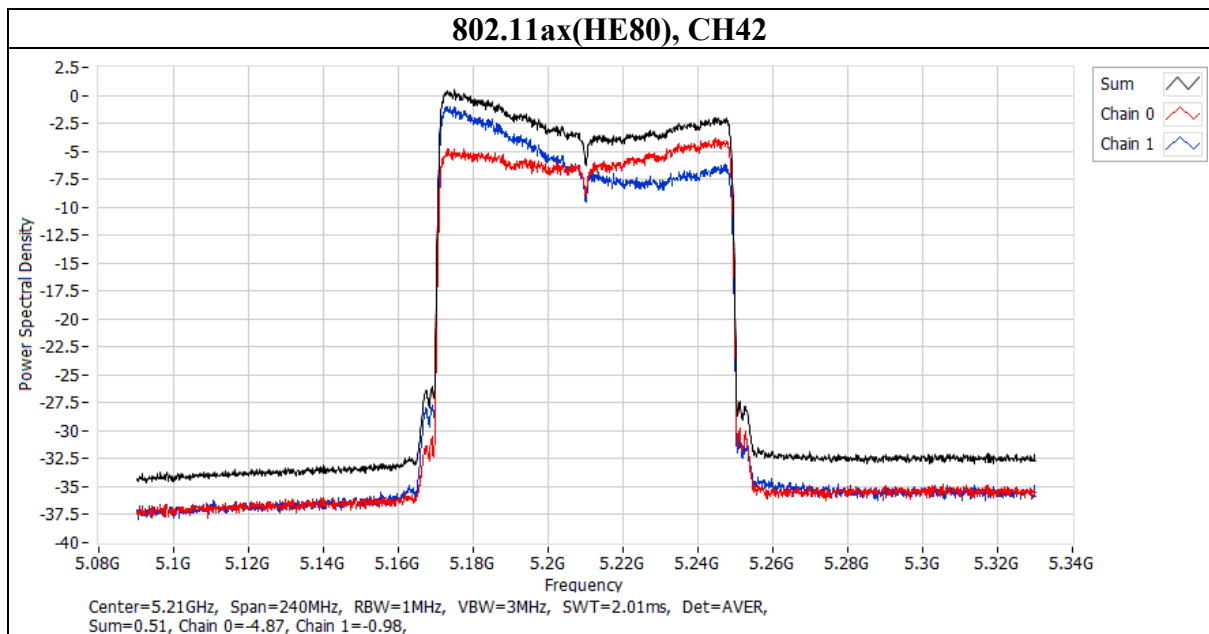
Mode (U-NII-1)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ax(HE40)	38	5190	9.06	0.66	7.94	PASS
	46	5230	9.06	0.59	7.94	PASS

Mode (U-NII-1)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ax(HE40)	38	5190	-2.54	-1.63
	46	5230	-2.58	-2.09



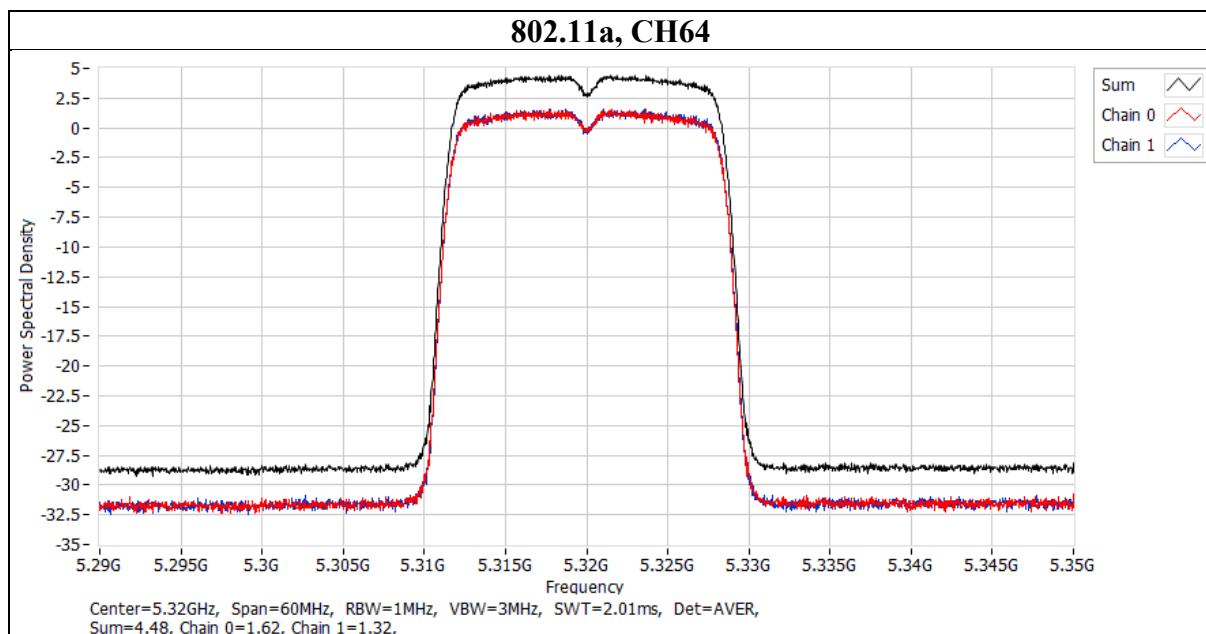
Mode (U-NII-1)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ax(HE80)	42	5210	9.06	0.51	7.94	PASS

Mode (U-NII-1)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ax(HE80)	42	5210	-3.78	-0.98



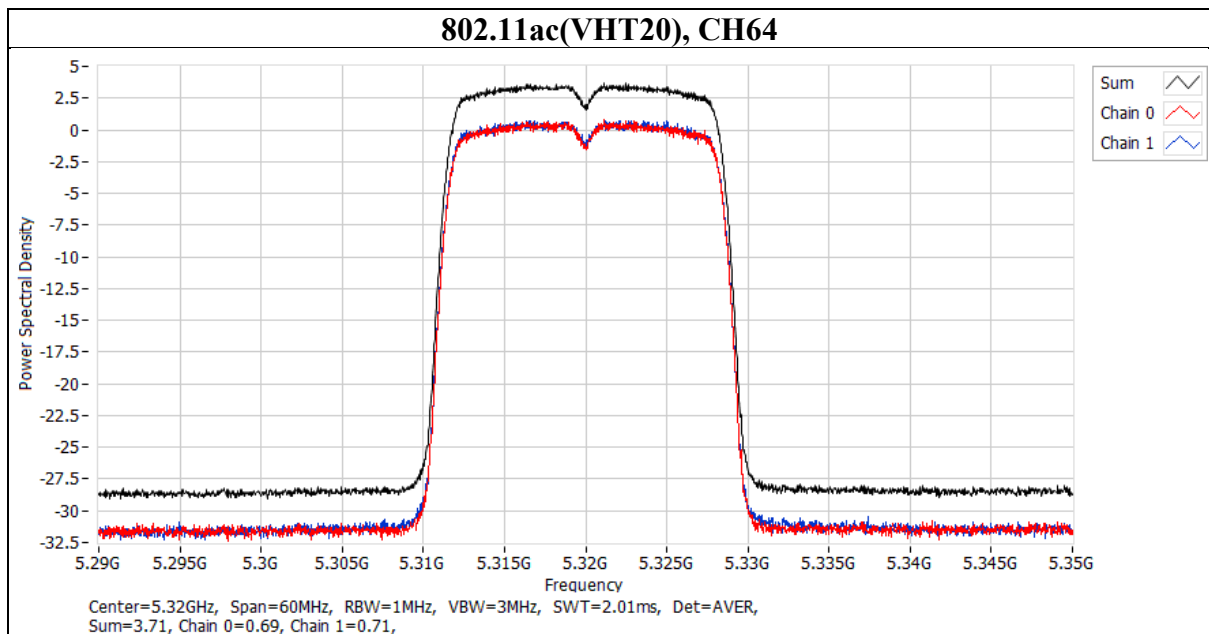
Mode (U-NII-2A)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11a	52	5260	9.06	4.45	7.94	PASS
	60	5300	9.06	4.46	7.94	PASS
	64	5320	9.06	4.48	7.94	PASS

Mode (U-NII-2A)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11a	52	5260	1.36	2.05
	60	5300	1.67	1.64
	64	5320	1.62	1.6



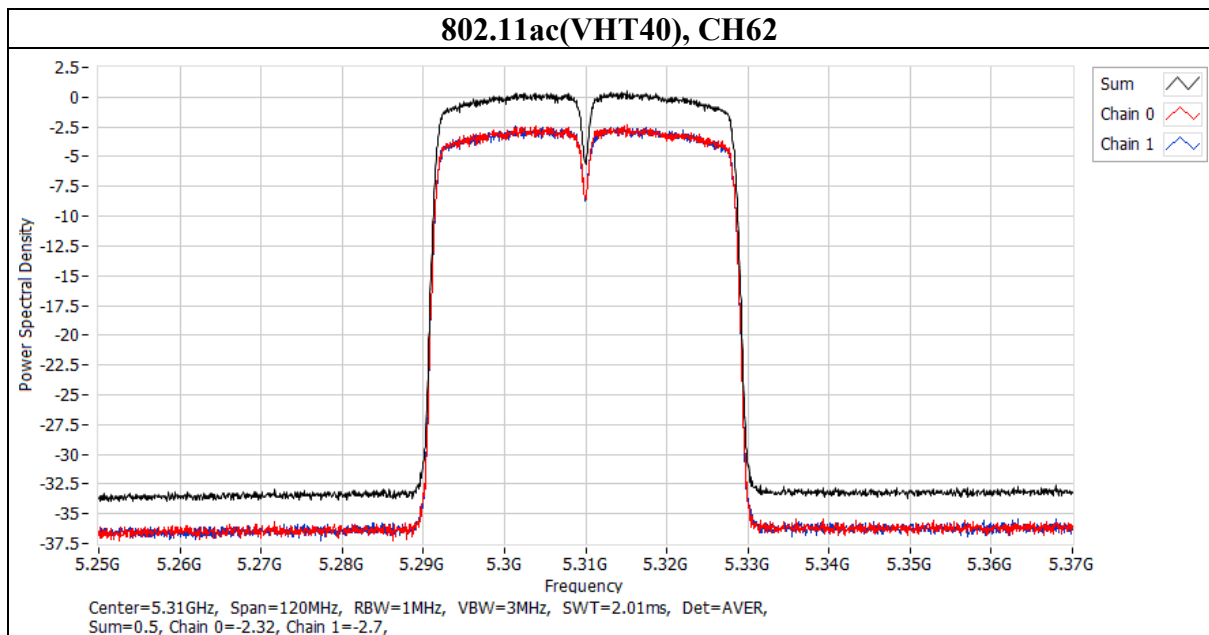
Mode (U-NII-2A)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ac(VHT20)	52	5260	9.06	3.22	7.94	PASS
	60	5300	9.06	3.63	7.94	PASS
	64	5320	9.06	3.71	7.94	PASS

Mode (U-NII-2A)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ac(VHT20)	52	5260	0.38	0.48
	60	5300	0.63	0.75
	64	5320	0.77	0.73



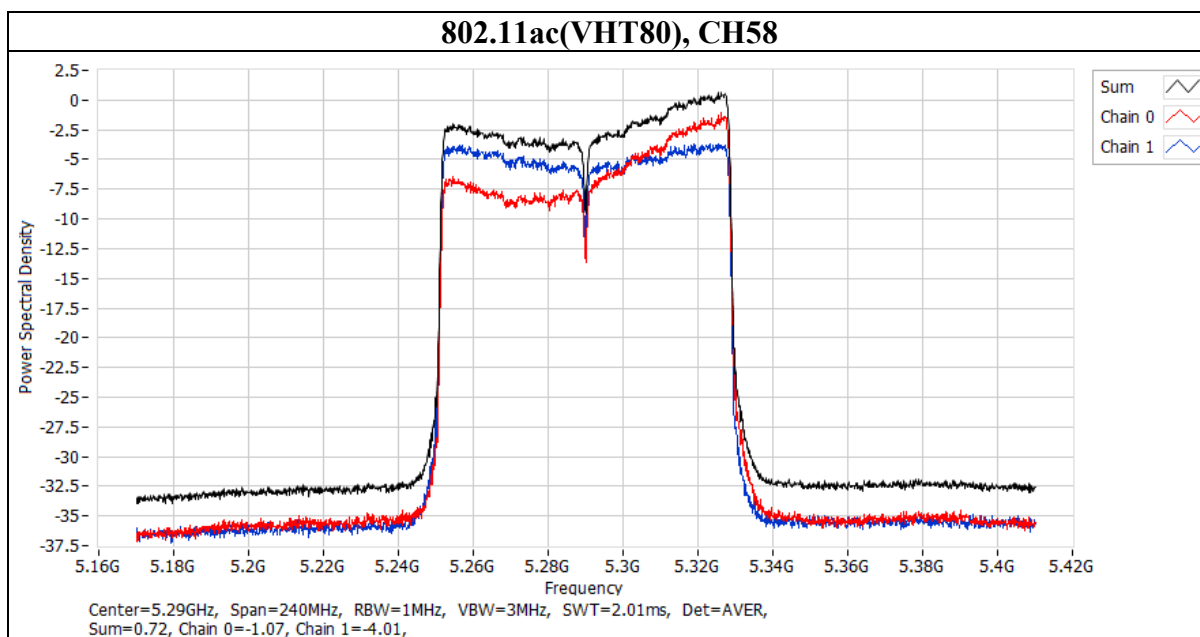
Mode (U-NII-2A)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ac(VHT40)	54	5270	9.06	0.44	7.94	PASS
	62	5310	9.06	0.5	7.94	PASS

Mode (U-NII-2A)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ac(VHT40)	54	5270	-2.54	-2.19
	62	5310	-2.32	-2.49



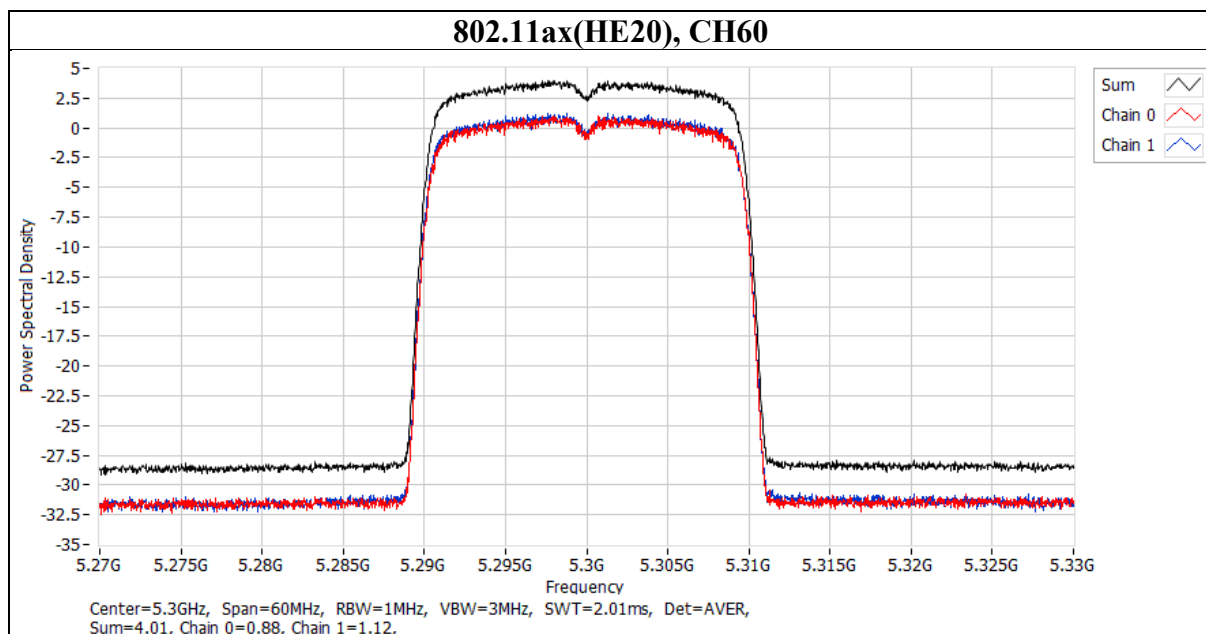
Mode (U-NII-2A)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ac(VHT80)	58	5290	9.06	0.72	7.94	PASS

Mode (U-NII-2A)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ac(VHT80)	58	5290	-1.07	-3.69



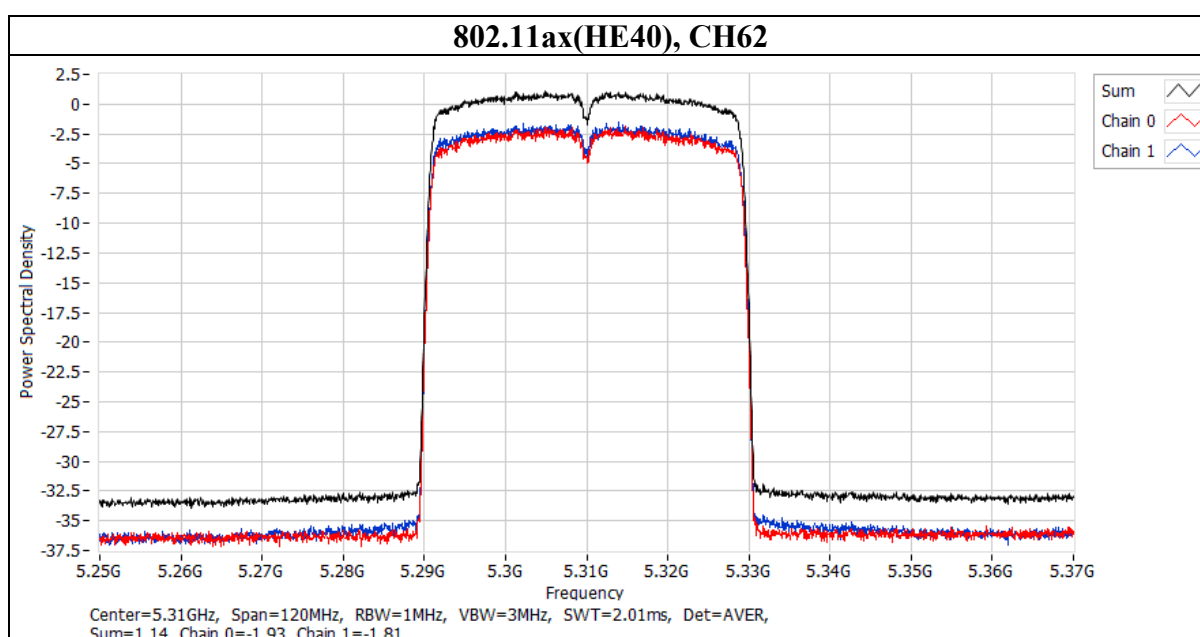
Mode (U-NII-2A)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ax(HE20)	52	5260	9.06	3.97	7.94	PASS
	60	5300	9.06	4.01	7.94	PASS
	64	5320	9.06	3.99	7.94	PASS

Mode (U-NII-2A)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ax(HE20)	52	5260	0.69	1.37
	60	5300	0.98	1.2
	64	5320	1.13	1.31



Mode (U-NII-2A)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ax(HE40)	54	5270	9.06	0.94	7.94	PASS
	62	5310	9.06	1.14	7.94	PASS

Mode (U-NII-2A)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ax(HE40)	54	5270	-2.17	-1.58
	62	5310	-1.9	-1.57



Underwriters Laboratories Taiwan Co., Ltd.

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

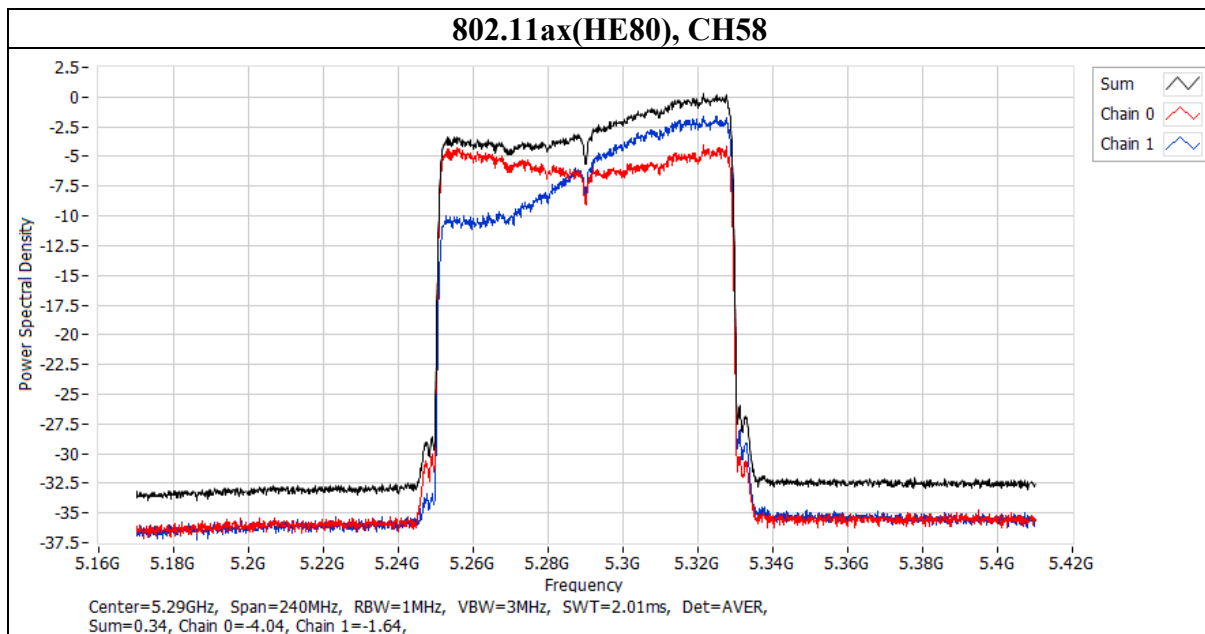
Telephone :+886-2-7737-3000

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

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

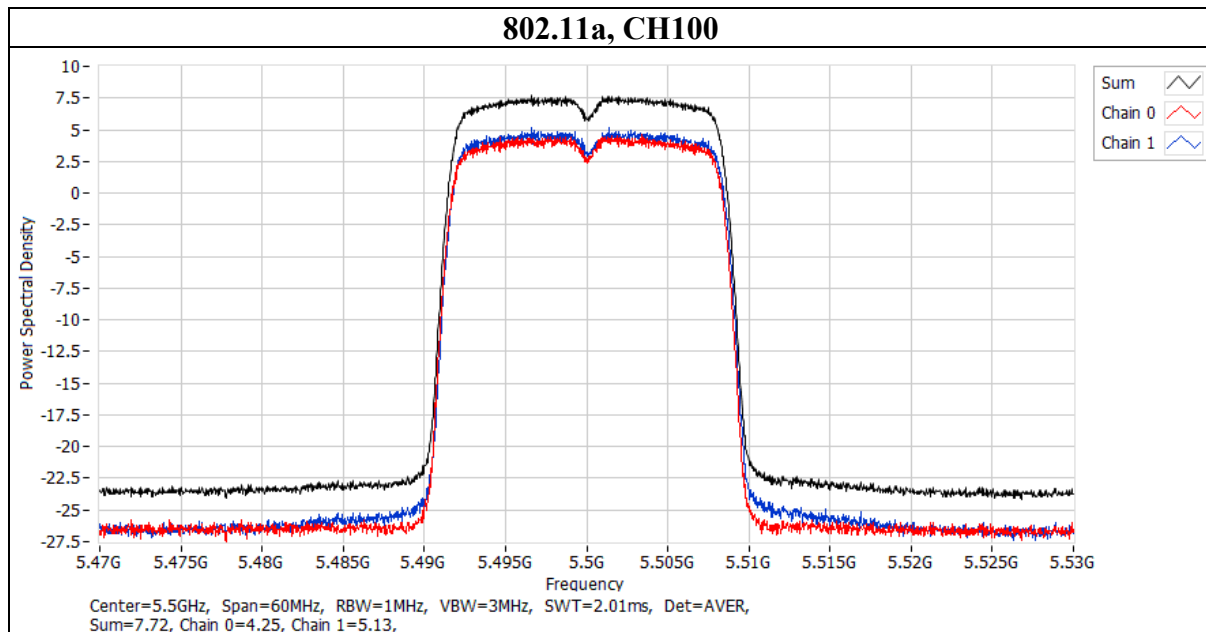
Mode (U-NII-2A)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ax(HE80)	58	5290	9.06	0.34	7.94	PASS

Mode (U-NII-2A)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ax(HE80)	58	5290	-4.04	-1.6



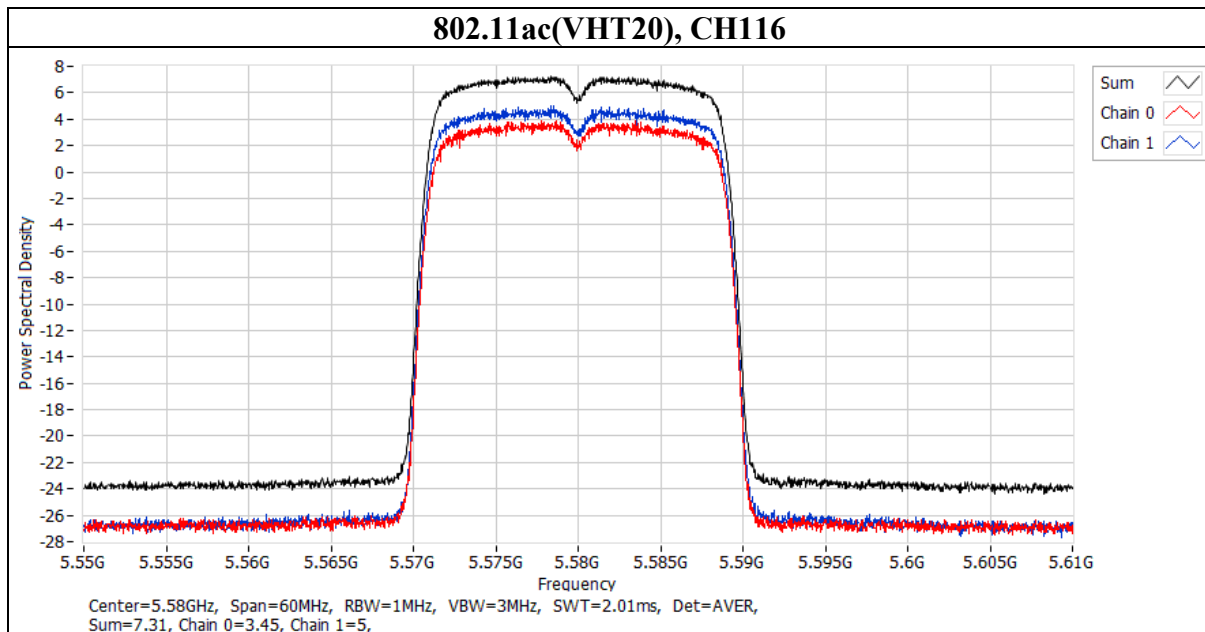
Mode (U-NII-2C)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11a	100	5500	9.06	7.72	7.94	PASS
	116	5580	9.06	7.64	7.94	PASS
	140	5700	9.06	7.6	7.94	PASS
	144	5720	9.06	7.09	7.94	PASS

Mode (U-NII-2C)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11a	100	5500	4.58	5.13
	116	5580	3.79	5.35
	140	5700	3.91	5.46
	144	5720	3.62	4.83



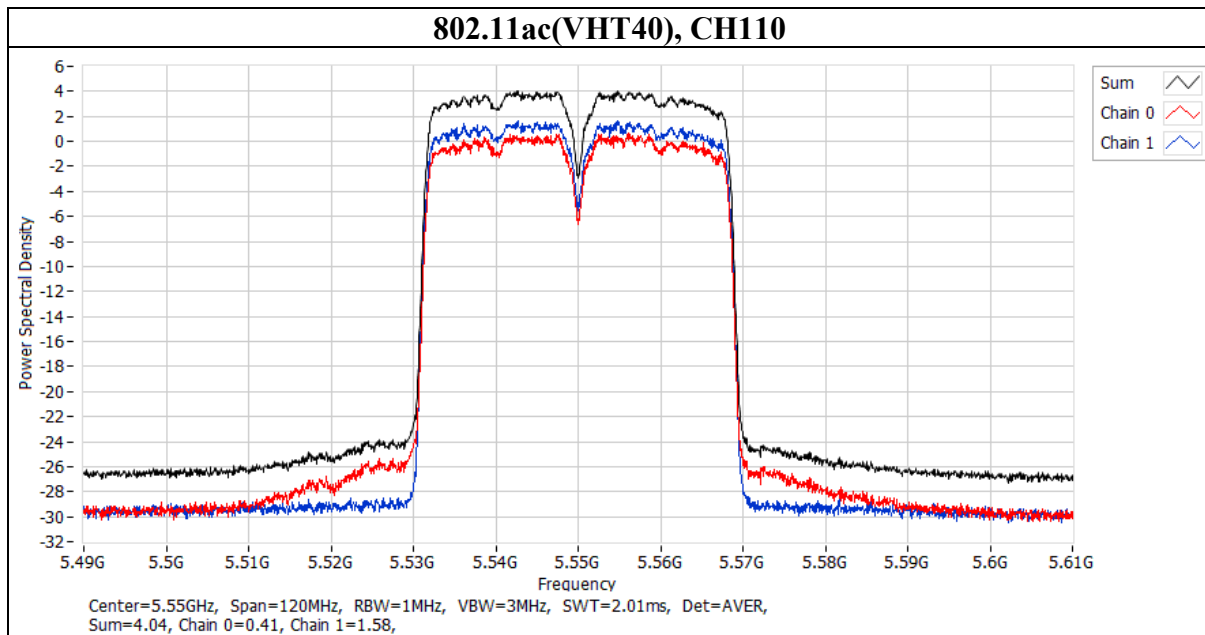
Mode (U-NII-2C)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ac(VHT20)	100	5500	9.06	6.86	7.94	PASS
	116	5580	9.06	7.31	7.94	PASS
	140	5700	9.06	6.95	7.94	PASS
	144	5720	9.06	7.14	7.94	PASS

Mode (U-NII-2C)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ac(VHT20)	100	5500	3.87	4.27
	116	5580	3.89	5
	140	5700	3.48	4.72
	144	5720	3.46	4.95



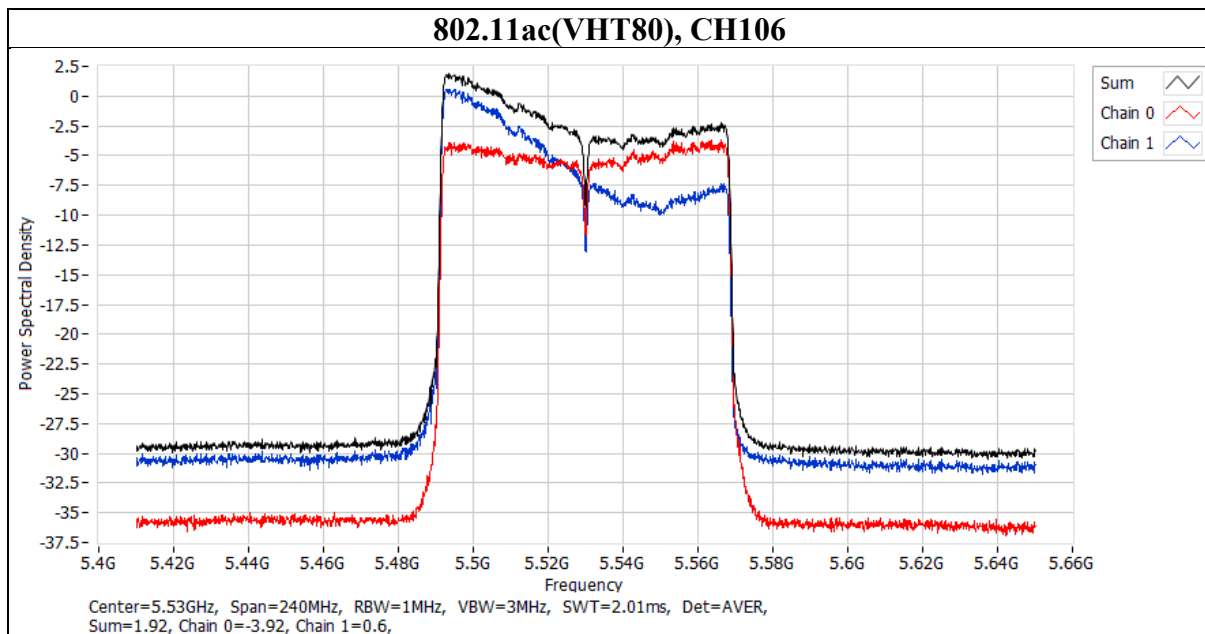
Mode (U-NII-2C)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ac(VHT40)	102	5510	9.06	2.32	7.94	PASS
	110	5550	9.06	4.04	7.94	PASS
	134	5670	9.06	3.82	7.94	PASS
	142	5710	9.06	2.93	7.94	PASS

Mode (U-NII-2C)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ac(VHT40)	102	5510	-0.83	-0.42
	110	5550	0.62	1.62
	134	5670	0.41	1.4
	142	5710	-0.67	0.79



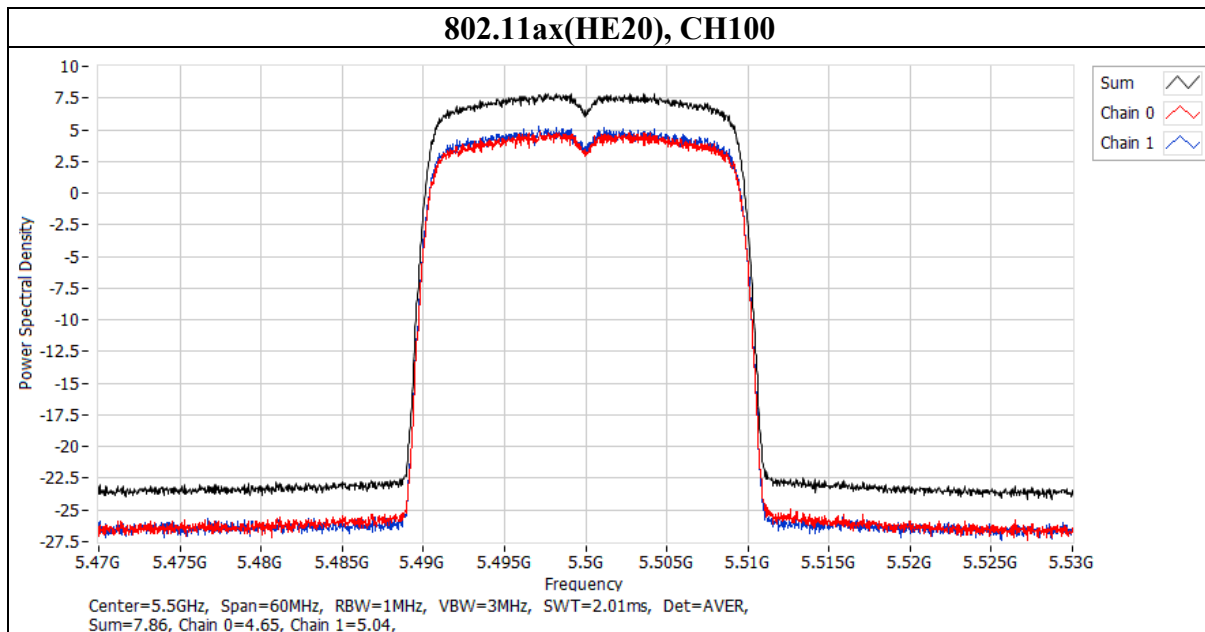
Mode (U-NII-2C)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ac(VHT80)	106	5530	9.06	1.92	7.94	PASS
	122	5610	9.06	1.87	7.94	PASS
	138	5690	9.06	0.54	7.94	PASS

Mode (U-NII-2C)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ac(VHT80)	106	5530	-3.65	0.6
	122	5610	-0.51	-1.57
	138	5690	-1.59	-2.91



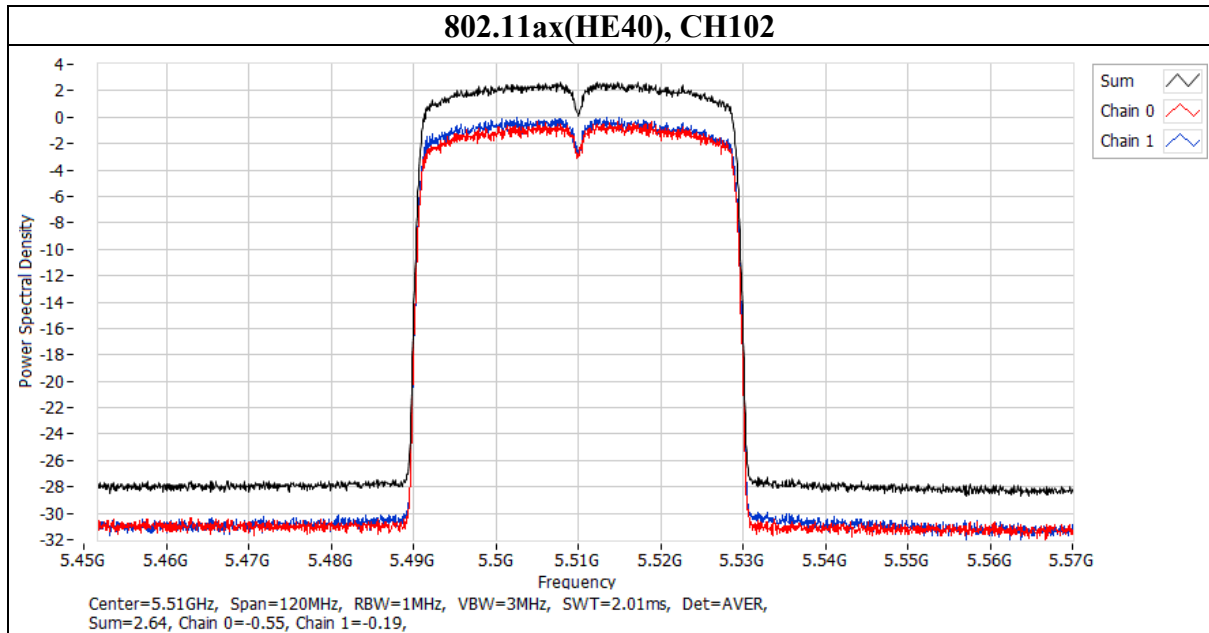
Mode (U-NII-2C)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ax(HE20)	100	5500	9.06	7.86	7.94	PASS
	116	5580	9.06	7.75	7.94	PASS
	140	5700	9.06	6.78	7.94	PASS
	144	5720	9.06	7.1	7.94	PASS

Mode (U-NII-2C)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ax(HE20)	100	5500	4.81	5.26
	116	5580	4.37	5.39
	140	5700	3.48	4.44
	144	5720	3.52	4.9



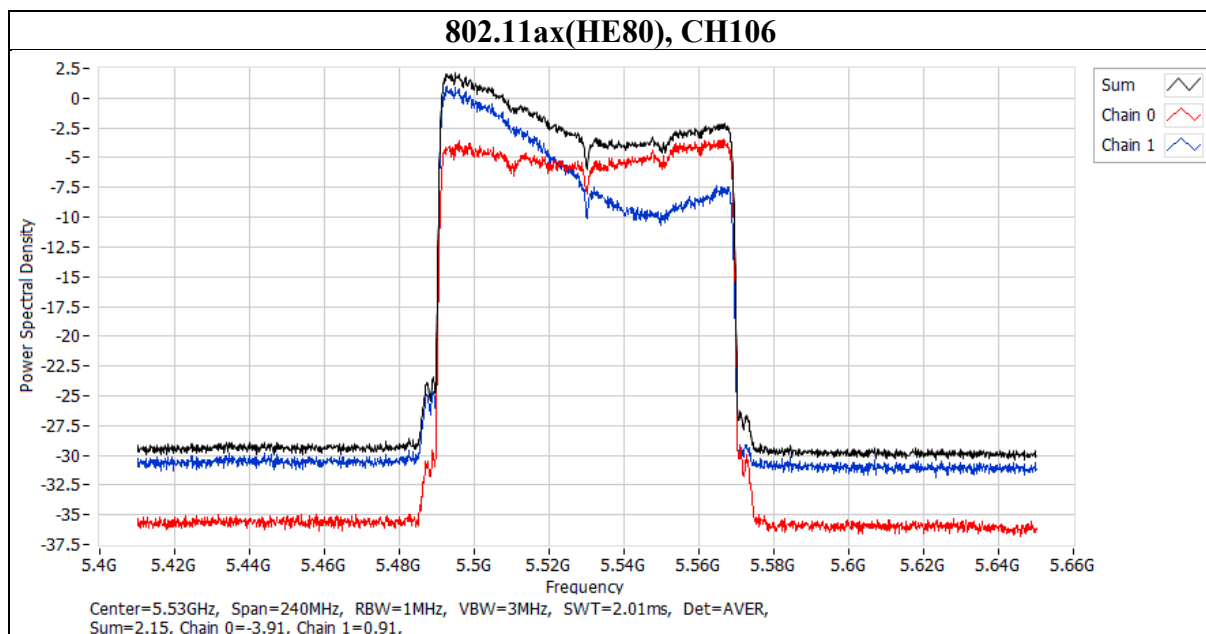
Mode (U-NII-2C)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ax(HE40)	102	5510	9.06	2.64	7.94	PASS
	110	5550	9.06	1.54	7.94	PASS
	134	5670	9.06	0.89	7.94	PASS
	142	5710	9.06	0.73	7.94	PASS

Mode (U-NII-2C)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ax(HE40)	102	5510	-0.37	-0.02
	110	5550	-2.13	-0.78
	134	5670	-2.44	-1.35
	142	5710	-2.94	-1.24



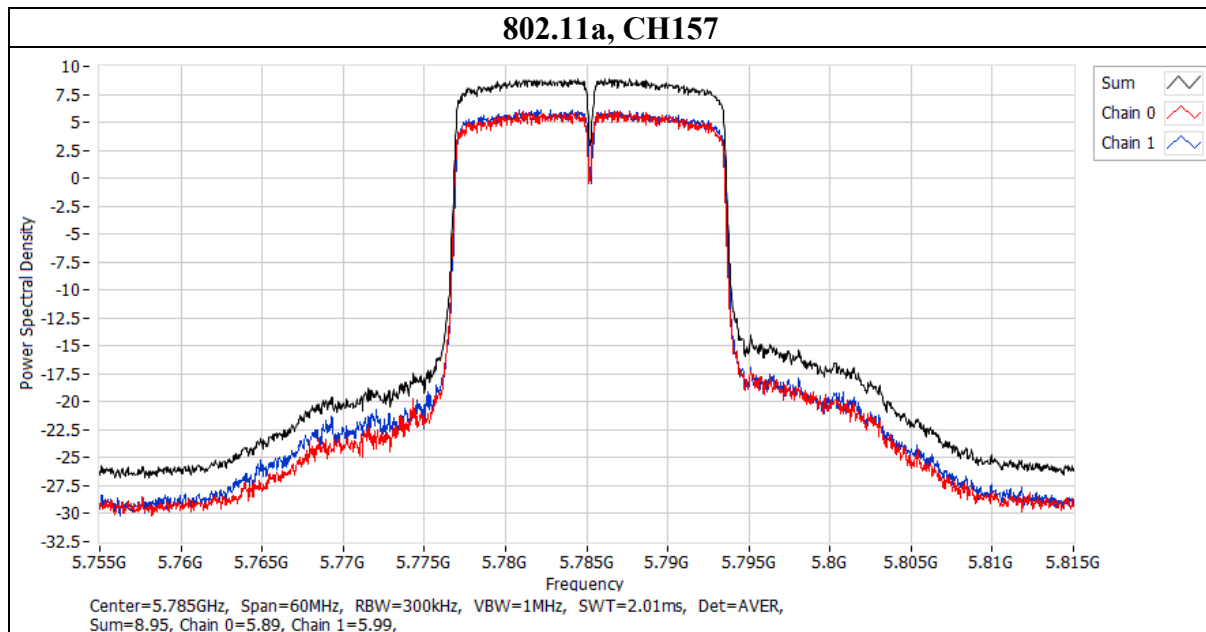
Mode (U-NII-2C)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11ax(HE80)	106	5530	9.06	2.15	7.94	PASS
	122	5610	9.06	0.35	7.94	PASS
	138	5690	9.06	1.05	7.94	PASS

Mode (U-NII-2C)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)	
			Chain 0	Chain 1
802.11ax(HE80)	106	5530	-3.45	0.95
	122	5610	-4.77	-1.1
	138	5690	-1.07	-2.47



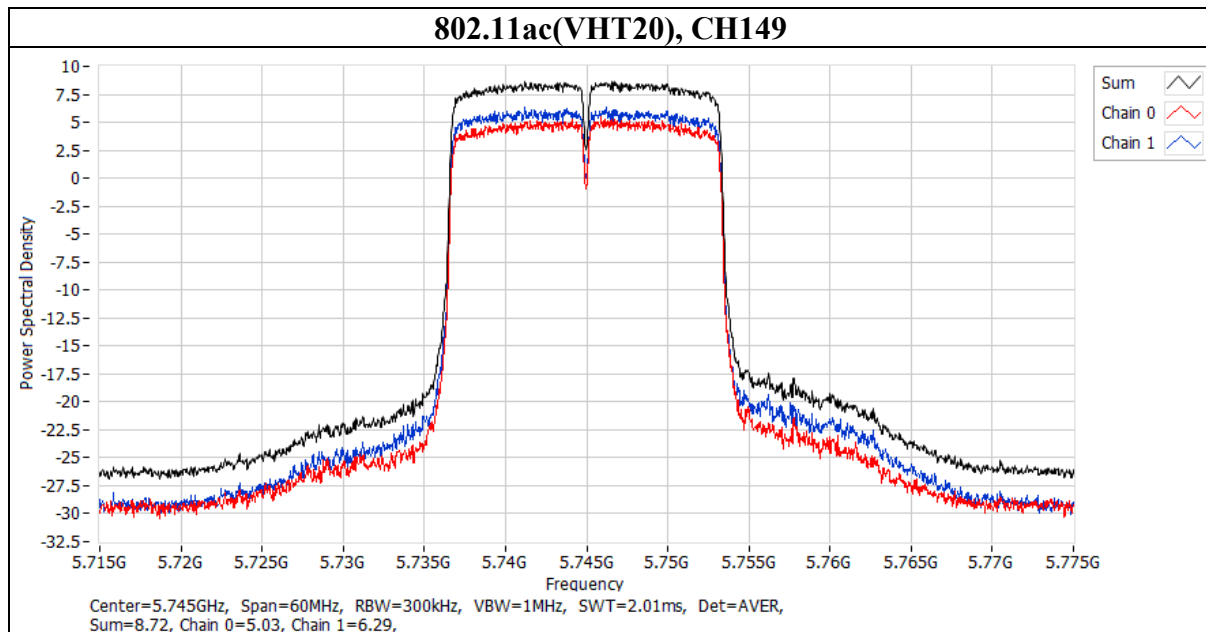
Mode (U-NII-3)	CH	Freq (MHz)	BWCF	Directional Gain (dBi)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
802.11a	144	5720	2.22	9.06	6.71	26.94	PASS
	149	5745	2.22	9.06	10.87	26.94	PASS
	157	5785	2.22	9.06	11.17	26.94	PASS
	165	5825	2.22	9.06	10.9	26.94	PASS

Mode (U-NII-3)	CH	Freq (MHz)	PSD per Chain (dBm/500kHz)	
			Chain 0	Chain 1
802.11a	144	5720	1.05	2.25
	149	5745	6.18	5.32
	157	5785	6.06	6.13
	165	5825	5.86	5.9



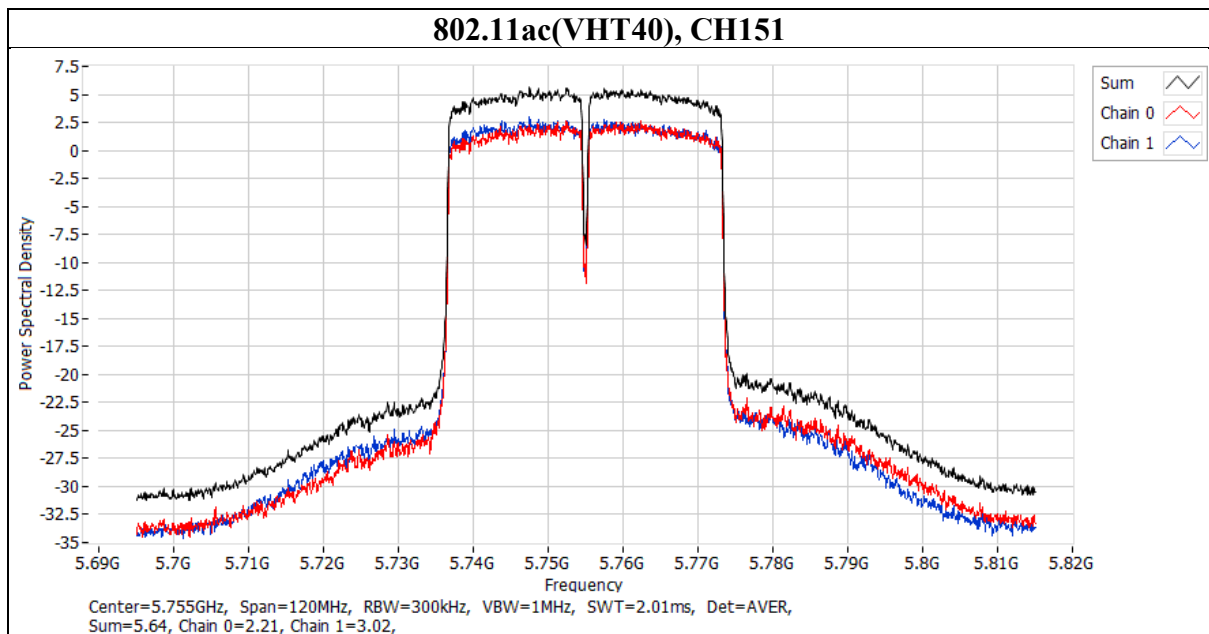
Mode (U-NII-3)	CH	Freq (MHz)	BWCF	Directional Gain (dBi)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
802.11ac(VHT20)	144	5720	2.22	9.06	7.02	26.94	PASS
	149	5745	2.22	9.06	10.93	26.94	PASS
	157	5785	2.22	9.06	10.67	26.94	PASS
	165	5825	2.22	9.06	10.25	26.94	PASS

Mode (U-NII-3)	CH	Freq (MHz)	PSD per Chain (dBm/500kHz)	
			Chain 0	Chain 1
802.11ac(VHT20)	144	5720	1.39	2.48
	149	5745	5.45	6.31
	157	5785	5.38	5.75
	165	5825	5.17	5.39



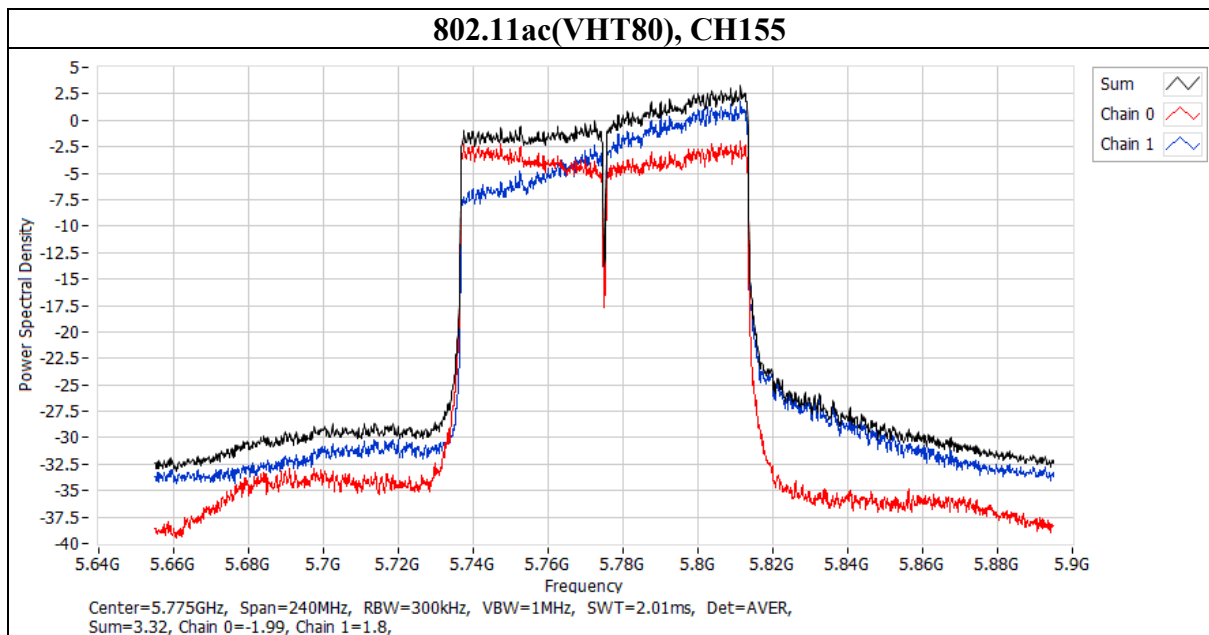
Mode (U-NII-3)	CH	Freq (MHz)	BWCF	Directional Gain (dBi)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
802.11ac(VHT40)	142	5710	2.22	9.06	2.92	26.94	PASS
	151	5755	2.22	9.06	7.86	26.94	PASS
	159	5795	2.22	9.06	7.57	26.94	PASS

Mode (U-NII-3)	CH	Freq (MHz)	PSD per Chain (dBm/500kHz)	
			Chain 0	Chain 1
802.11ac(VHT40)	142	5710	-2.73	-1.59
	151	5755	2.61	3.02
	159	5795	2.64	2.25



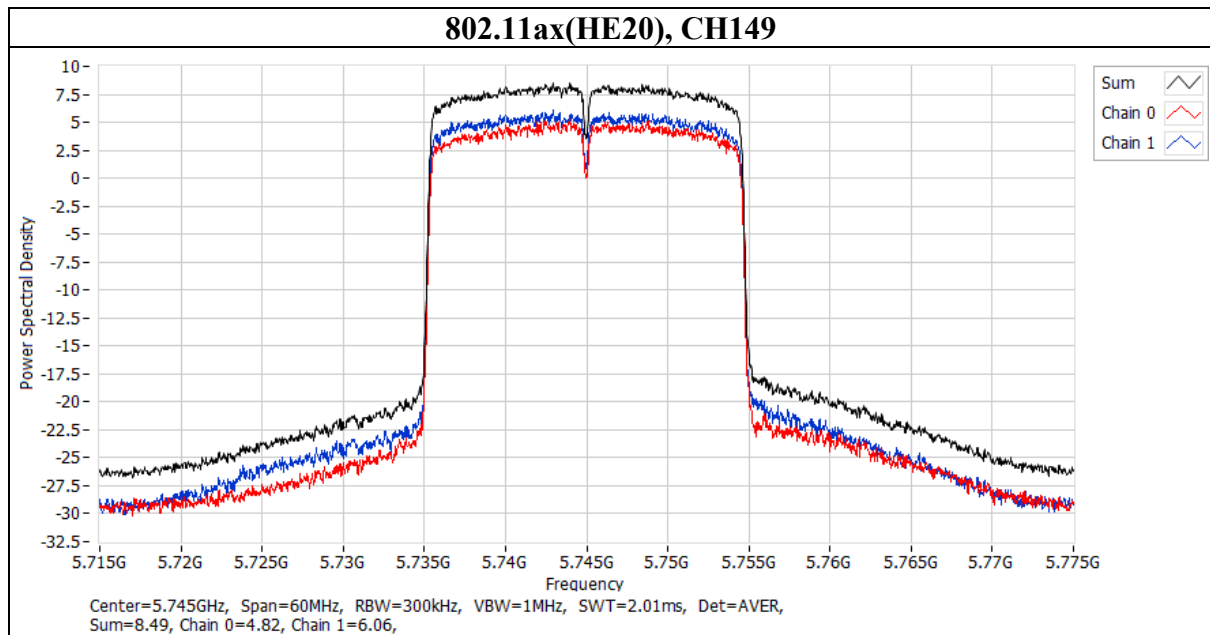
Mode (U-NII-3)	CH	Freq (MHz)	BWCF	Directional Gain (dBi)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
802.11ac(VHT80)	138	5690	2.22	9.06	0.6	26.94	PASS
	155	5775	2.22	9.06	5.54	26.94	PASS

Mode (U-NII-3)	CH	Freq (MHz)	PSD per Chain (dBm/500kHz)	
			Chain 0	Chain 1
802.11ac(VHT80)	138	5690	-3.45	-5.04
	155	5775	-1.99	1.8



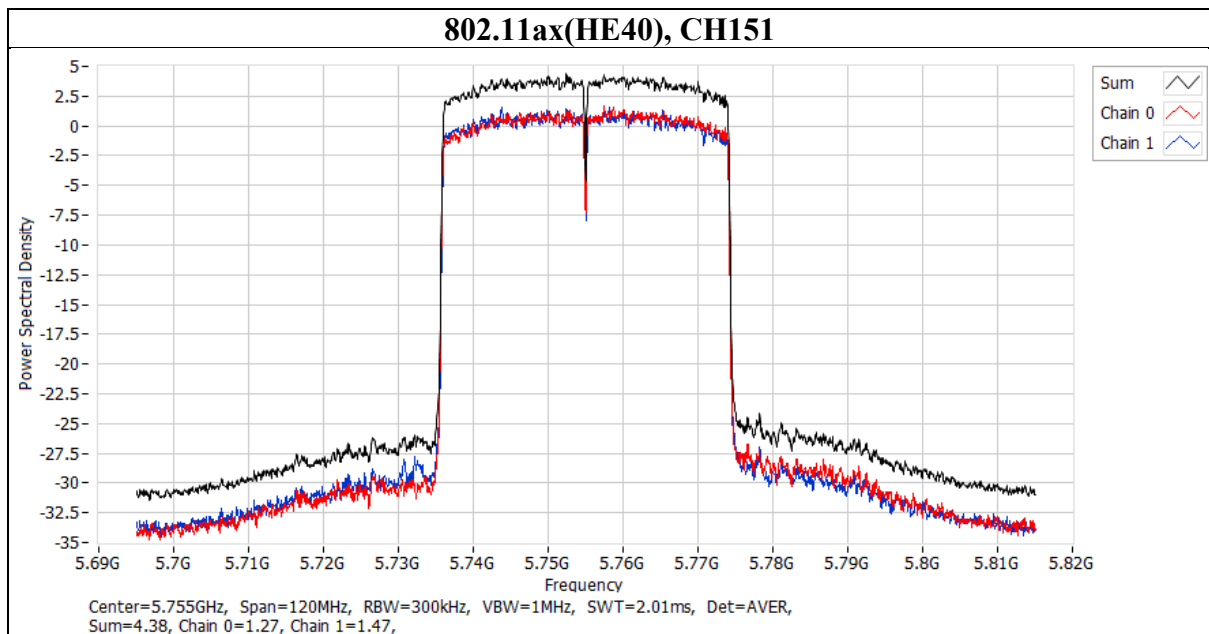
Mode (U-NII-3)	CH	Freq (MHz)	BWCF	Directional Gain (dBi)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
802.11ax(HE20)	144	5720	2.22	9.06	6.94	26.94	PASS
	149	5745	2.22	9.06	10.71	26.94	PASS
	157	5785	2.22	9.06	10.61	26.94	PASS
	165	5825	2.22	9.06	10.23	26.94	PASS

Mode (U-NII-3)	CH	Freq (MHz)	PSD per Chain (dBm/500kHz)	
			Chain 0	Chain 1
802.11ax(HE20)	144	5720	1.05	2.49
	149	5745	5.27	6.06
	157	5785	5.38	5.75
	165	5825	5.32	5.03



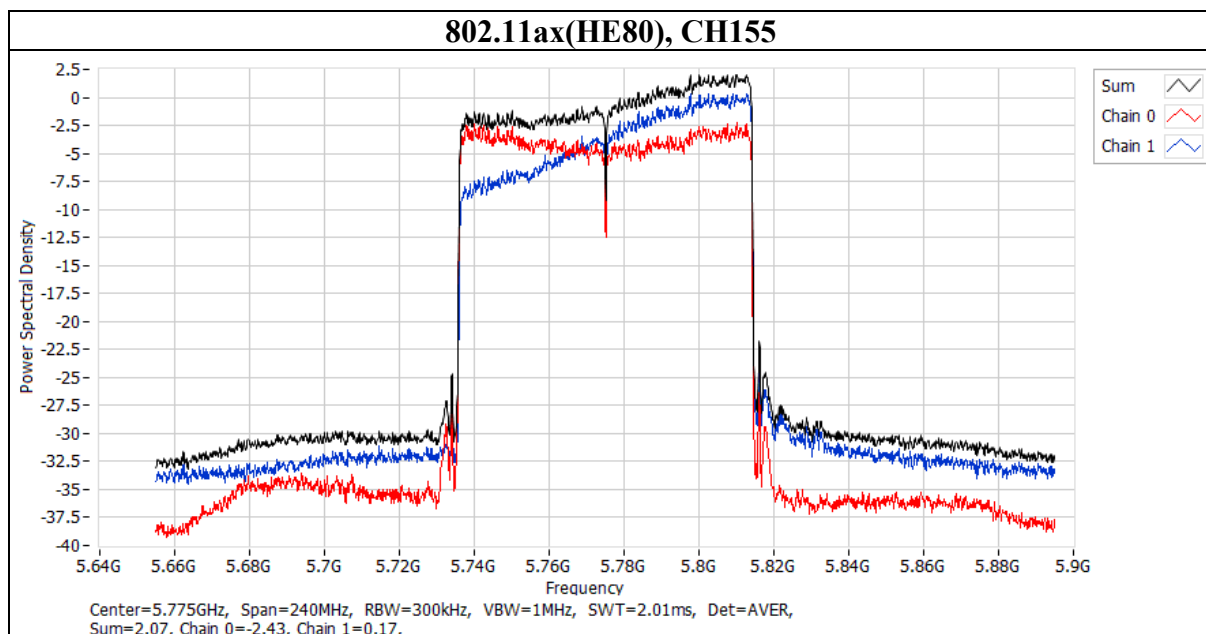
Mode (U-NII-3)	CH	Freq (MHz)	BWCF	Directional Gain (dBi)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
802.11ax(HE40)	142	5710	2.22	9.06	0.73	26.94	PASS
	151	5755	2.22	9.06	6.6	26.94	PASS
	159	5795	2.22	9.06	5.3	26.94	PASS

Mode (U-NII-3)	CH	Freq (MHz)	PSD per Chain (dBm/500kHz)	
			Chain 0	Chain 1
802.11ax(HE40)	142	5710	-5.21	-3.68
	151	5755	1.73	1.6
	159	5795	0.59	-0.04



Mode (U-NII-3)	CH	Freq (MHz)	BWCF	Directional Gain (dBi)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
802.11ax(HE80)	138	5690	2.22	9.06	0.71	26.94	PASS
	155	5775	2.22	9.06	4.29	26.94	PASS

Mode (U-NII-3)	CH	Freq (MHz)	PSD per Chain (dBm/500kHz)	
			Chain 0	Chain 1
802.11ax(HE80)	138	5690	-3.52	-4.92
	155	5775	-2.24	0.3



9.6. Frequency Stability

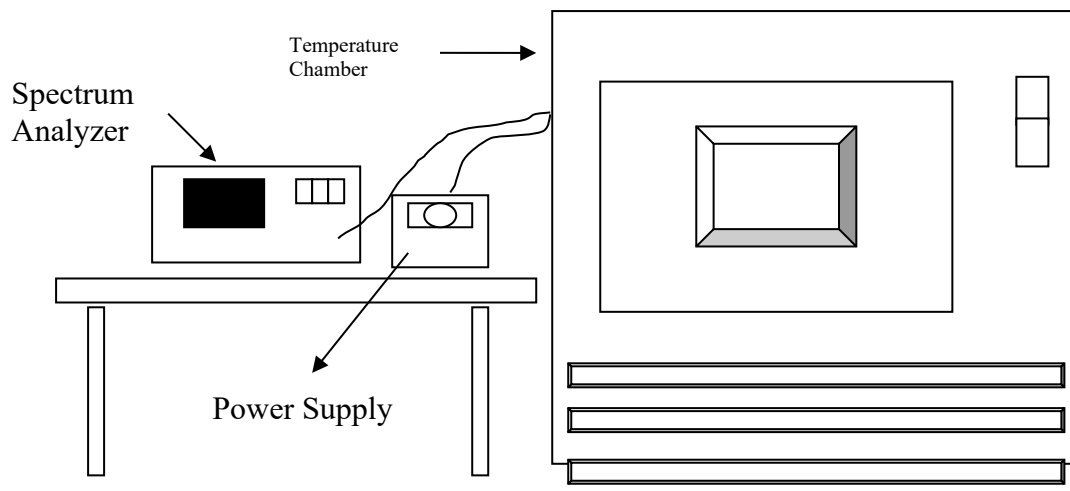
Requirements

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 (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)
85	120	5180.0263	5.08	5180.0267	5.15	5180.0234	4.52	5180.0258	4.98
80	120	5179.98	-3.86	5179.9841	-3.07	5179.9822	-3.44	5179.9815	-3.57
70	120	5179.9933	-1.29	5179.9909	-1.76	5179.995	-0.97	5179.9919	-1.56
60	120	5179.9796	-3.94	5179.9797	-3.92	5179.9797	-3.92	5179.9794	-3.98
50	120	5179.9888	-2.16	5179.9886	-2.20	5179.9906	-1.81	5179.9878	-2.36
40	120	5180.011	2.12	5180.0134	2.59	5180.01	1.93	5180.0123	2.37
30	120	5180.0206	3.98	5180.0183	3.53	5180.0181	3.49	5180.0186	3.59
20	120	5179.9889	-2.14	5179.9931	-1.33	5179.9933	-1.29	5179.9917	-1.60
10	120	5180.0015	0.29	5179.9998	-0.04	5180.0024	0.46	5179.9989	-0.21
0	120	5180.0076	1.47	5180.0078	1.51	5180.0095	1.83	5180.0067	1.29
-10	120	5180.0166	3.20	5180.0172	3.32	5180.0146	2.82	5180.0141	2.72
-20	120	5180.0019	0.37	5180.0004	0.08	5180.0031	0.60	5180.0018	0.35
-30	120	5180.0152	2.93	5180.0158	3.05	5180.0148	2.86	5180.0173	3.34
-40	120	5179.9933	-1.29	5179.9927	-1.41	5179.9934	-1.27	5179.9928	-1.39

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	5179.989	-2.12	5179.993	-1.35	5179.9932	-1.31	5179.9916	-1.62
20	120	5179.9889	-2.14	5179.9931	-1.33	5179.9933	-1.29	5179.9917	-1.60
20	102	5179.9891	-2.10	5179.9935	-1.25	5179.9923	-1.49	5179.9913	-1.68

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

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

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

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.

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

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) + 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.

Underwriters Laboratories Taiwan Co., Ltd.

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

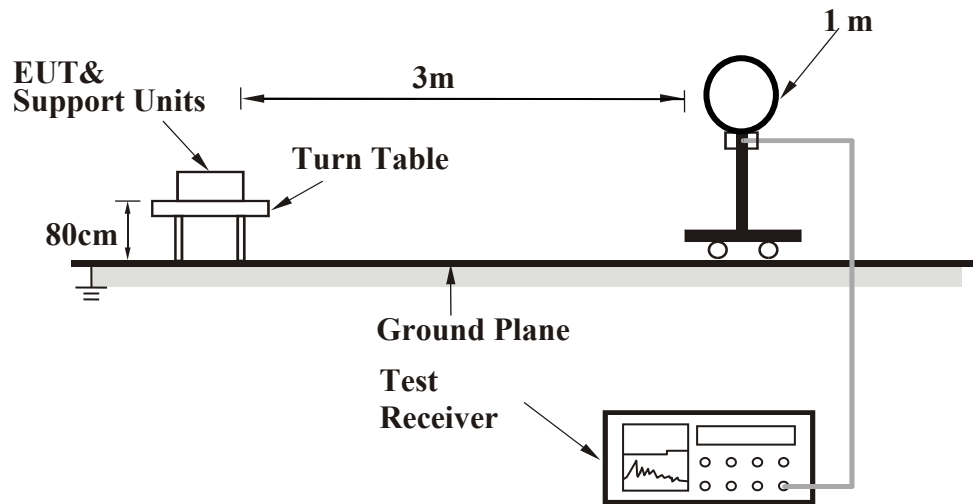
Telephone : +886-2-7737-3000

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

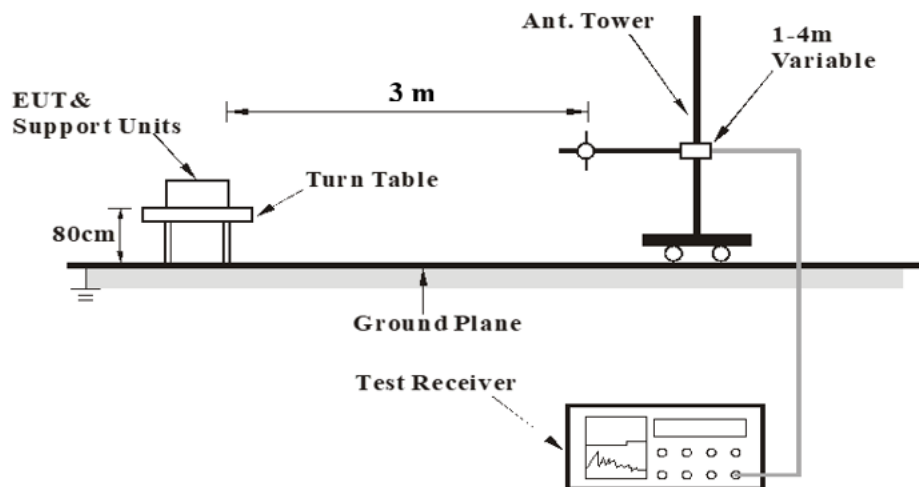
Doc No: Form-ULID-004739 (DCS:17-EM-F0878) / 6.1

Test Setup

<Frequency Range 9 kHz ~ 30 MHz>



<Frequency Range 30 MHz ~ 1 GHz >



Underwriters Laboratories Taiwan Co., Ltd.

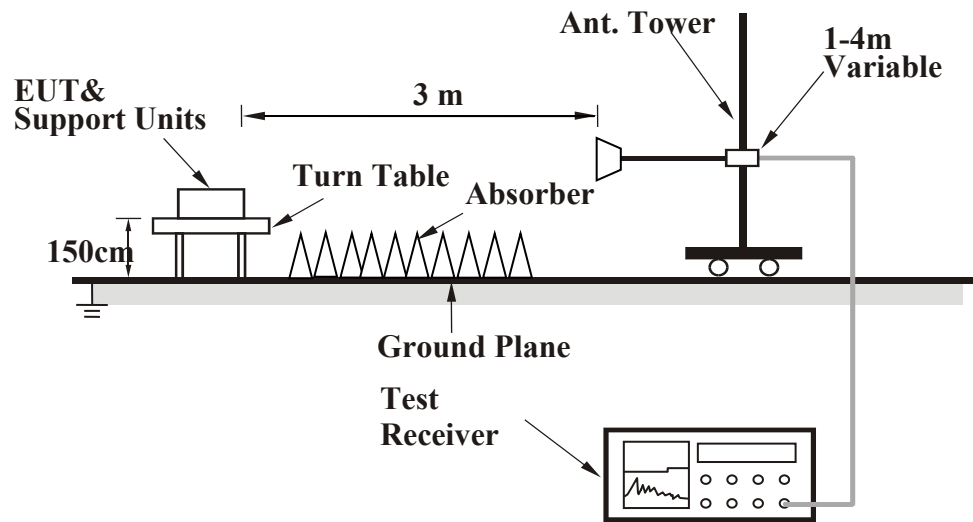
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

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

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

<Frequency Range above 1 GHz>



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

Test Data

WUBT-281AX [MU]

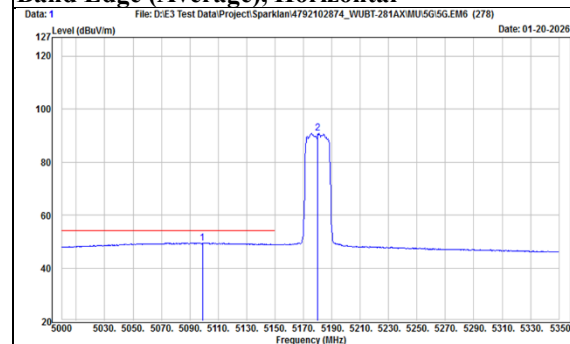
Above 1 GHz

Mode	802.11a	Channel	36
------	---------	---------	----

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		5064.75	43.09	18.35	61.44	74	-12.56	PK
		5099.05	30.81	18.65	49.46	54	-4.54	AVG
	@	5180	78.61	18.31	96.92	N/A	N/A	PK
	@	5180	72.5	18.31	90.81	N/A	N/A	AVG
Vertical		5091	42.69	18.58	61.27	74	-12.73	PK
		5094.15	31	18.61	49.61	54	-4.39	AVG
	@	5180	91.27	18.31	109.58	N/A	N/A	PK
	@	5180	83.43	18.31	101.74	N/A	N/A	AVG

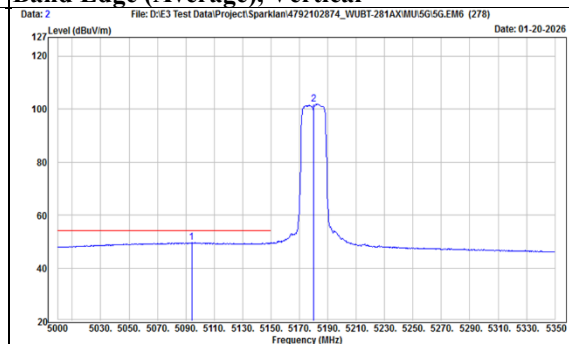
TX, 802.11a (Ch 36)

Band Edge (Average), Horizontal



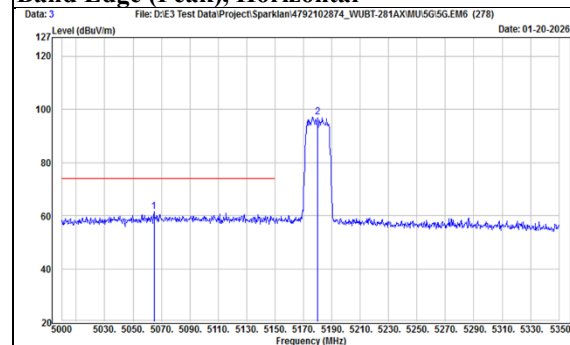
TX, 802.11a (Ch 36)

Band Edge (Average), Vertical



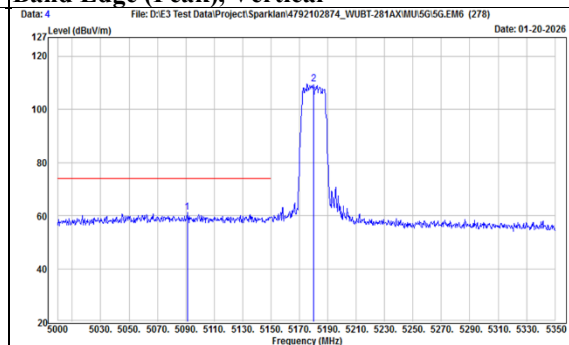
TX, 802.11a (Ch 36)

Band Edge (Peak), Horizontal



TX, 802.11a (Ch 36)

Band Edge (Peak), Vertical



Underwriters Laboratories Taiwan Co., Ltd.

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

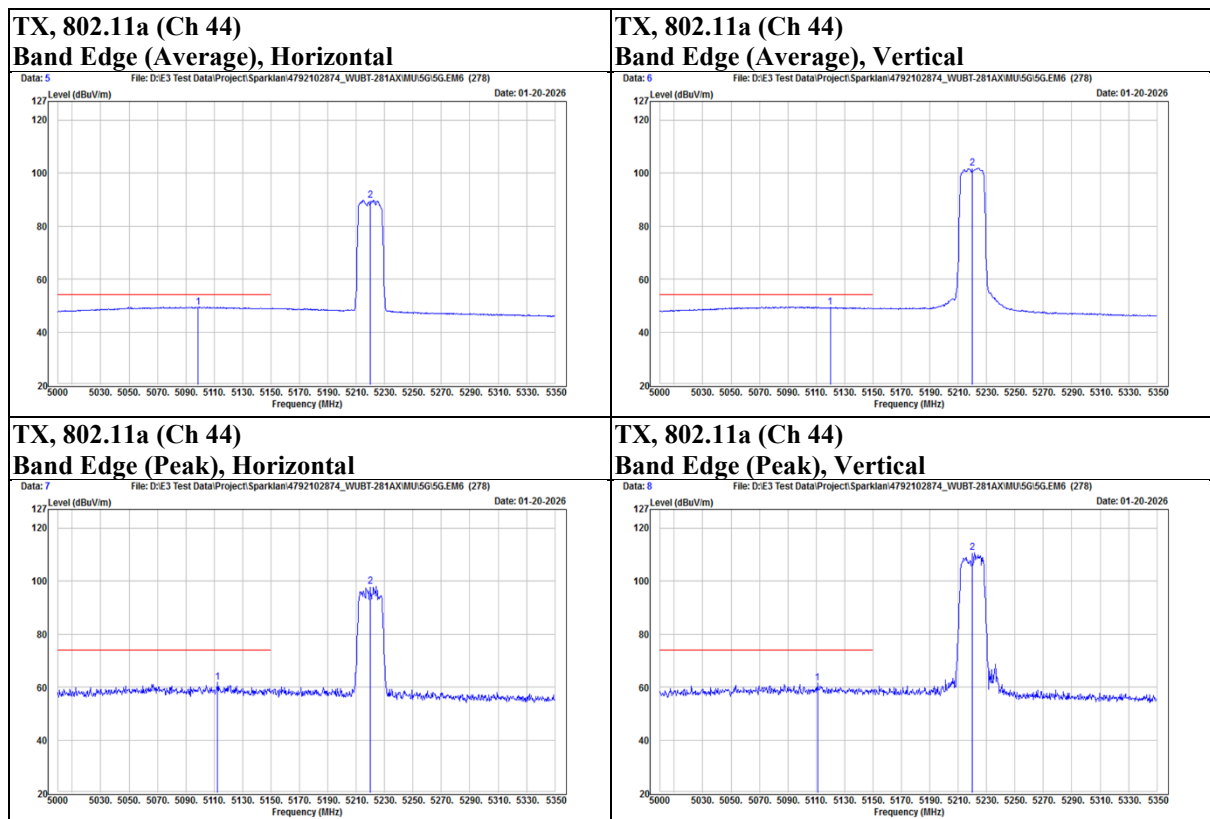
Telephone : +886-2-7737-3000

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

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

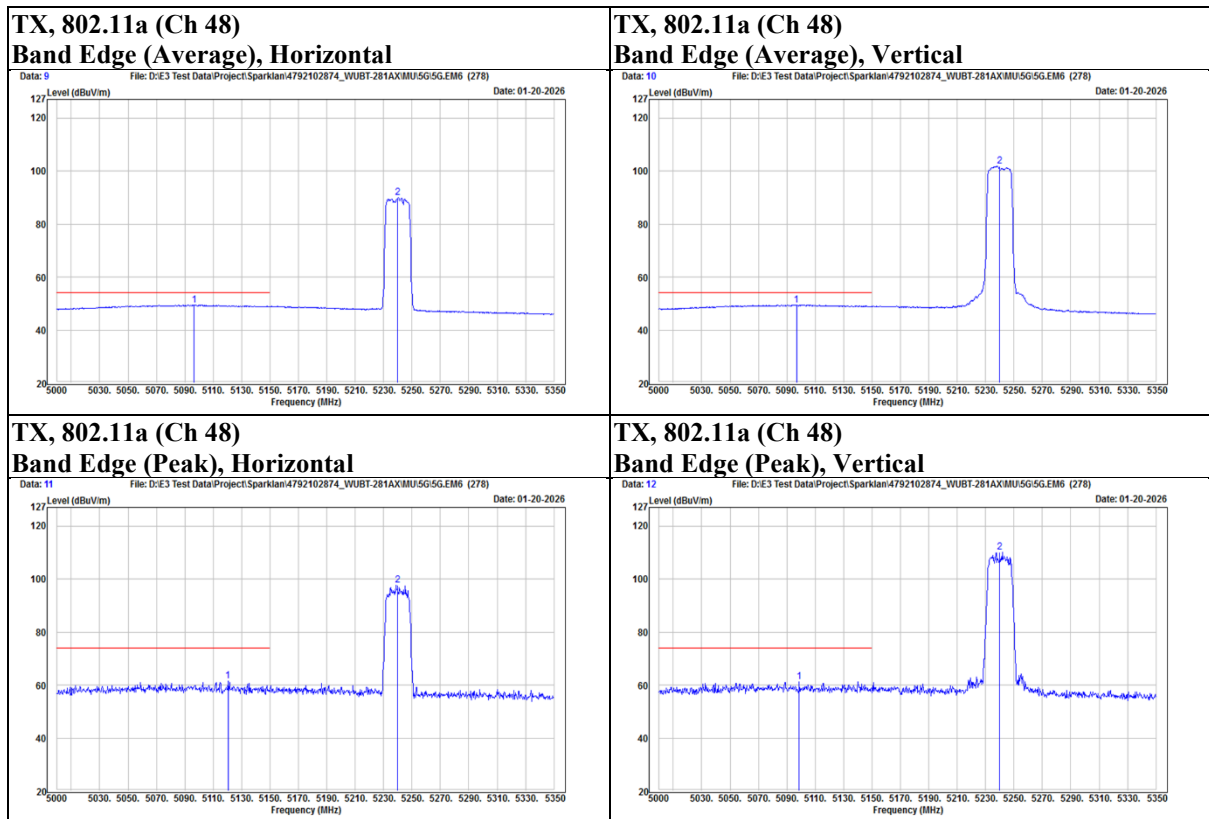
Mode	802.11a	Channel	44
------	---------	---------	----

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		5098.7	30.76	18.65	49.41	54	-4.59	AVG
		5112.35	43.26	18.63	61.89	74	-12.11	PK
	@	5220	79.74	18.15	97.89	N/A	N/A	PK
	@	5220	71.62	18.15	89.77	N/A	N/A	AVG
Vertical		5110.95	42.87	18.63	61.5	74	-12.5	PK
		5120.05	30.81	18.61	49.42	54	-4.58	AVG
	@	5220	92.65	18.15	110.8	N/A	N/A	PK
	@	5220	83.65	18.15	101.8	N/A	N/A	AVG



Mode	802.11a	Channel	48
------	---------	---------	----

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		5096.6	30.77	18.63	49.4	54	-4.6	AVG
		5120.4	42.92	18.61	61.53	74	-12.47	PK
	@	5240	79.66	18.13	97.79	N/A	N/A	PK
	@	5240	71.74	18.13	89.87	N/A	N/A	AVG
Vertical		5096.95	30.79	18.64	49.43	54	-4.57	AVG
		5098.7	42.58	18.65	61.23	74	-12.77	PK
	@	5240	92.11	18.13	110.24	N/A	N/A	PK
	@	5240	83.58	18.13	101.71	N/A	N/A	AVG



Mode	802.11a	Channel	52
------	---------	---------	----

Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	@	5260	80.29	18.1	98.39	N/A	N/A	PK
	@	5260	73.12	18.1	91.22	N/A	N/A	AVG
		5415	40.67	18.31	58.98	74	-15.02	PK
		5458.2	28.54	18.69	47.23	54	-6.77	AVG
Vertical	@	5260	93.53	18.1	111.63	N/A	N/A	PK
	@	5260	84.53	18.1	102.63	N/A	N/A	AVG
		5415.3	39.98	18.31	58.29	74	-15.71	PK
		5456.4	28.52	18.68	47.2	54	-6.8	AVG

