

RADIO TEST REPORT

Product : Security Camera
Model Name : VMC5050
Series Model : VMC5052
FCC ID : 2APLE18300435
Test Regulation : FCC 47 CFR Part 15 Subpart E (Section 15.407)
Received Date : 2025/4/16
Test Date : 2025/4/16 ~ 2025/6/26
Issued Date : 2025/7/15

Applicant : Arlo Technologies Inc
5770 Fleet St, Suite 200, Carlsbad, CA 92008 USA

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

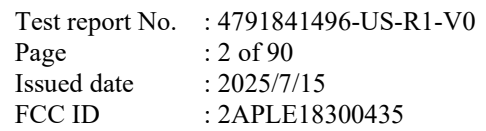


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Doc No: Form-ULID-004739 (DCS:17-EM-F0878) / 6.1



Original Test Report No.: 4791841496-US-R1-V0

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1. Attestation of Test Results

APPLICANT: Arlo Technologies Inc
5770 Fleet St, Suite 200, Carlsbad, CA 92008 USA

MANUFACTURER: Arlo Technologies Inc
5770 Fleet St, Suite 200, Carlsbad, CA 92008 USA

EUT DESCRIPTION: Security Camera

BRAND: arlo

MODEL: VMC5050

SERIES MODEL: VMC5052

SAMPLE STAGE: Engineering Verification Test Sample

DATE of TESTED: 2025/4/16 ~ 2025/6/26

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

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

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

Prepared By:



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Project Handler

Date : 2025/7/15

Approved and Authorized By:



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Date : 2025/7/15

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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.: 4791841496-US-R2-V0

3. Test Methodology and Reference Procedures

The tests documented in this report were performed in accordance with 47 CFR FCC Part 2, KDB 789033 D02 General UNII Test Procedure New Rules v02r01, KDB414788 D01 Radiated Test Site v01r01, ANSI C63.10-2013.

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	3.0 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

6. Equipment under Test

6.1. Description of EUT

Product	Security Camera
Brand Name	arlo
Model Name	VMC5050
Series Model	VMC5052
Normal Voltage	5Vdc from USB Host 3.6Vdc/3.89Vdc from Battery

Operating Frequency	5180 ~ 5240MHz, 5260 ~ 5320MHz, 5500 ~ 5720MHz, 5745 ~ 5825MHz
Modulation	64QAM, 16QAM, QPSK, BPSK for OFDM
Transfer Rate	802.11a: up to 54 Mbps 802.11n: up to MCS7
Maximum Output Power	5180 ~ 5240 MHz: 20.7 dBm 5260 ~ 5320 MHz: 20.58 dBm 5500 ~ 5720 MHz: 20.42 dBm 5745 ~ 5825 MHz: 19.54 dBm
Sample ID	Conducted Test:8586803 Radiated Test:8586803

Note:

1. The models difference table as below:

Model	Difference
VMC5050	Regular housing ; 1 cell battery(A-23)
VMC5052	Large housing ; 4 cell battery(A-14)

2. EUT provides a complete 1Tx port and 1Rx port. Please refer to the following working transmission conditions:

Modulation Mode	Tx Function	Rx Function
802.11a	1Tx Diversity	1Rx Diversity
802.11n (HT20)	1Tx Diversity	1Rx Diversity

3. The EUT contains following accessory devices:

Product	Brand	Model	Description
Battery	Arlo	A-23	3.89Vdc, 21.41Wh, 5655mAh
Battery	Arlo	A-14	3.6Vdc, 46.8Wh, 13000mAh
Mount	Arlo	Mount	-

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

6.2. Channel List

FOR 5180 ~ 5240MHz

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

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

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

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	-	-

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	-	-

6.3. Test Condition

Test Item	Test Site No.	Environmental	Input Power	Test Date	Tested by
Antenna Port Conducted Measurement	SR4	22~24°C/ 64~69%RH	5Vdc	2025/06/11~ 2025/06/24	WaterNil Guan
Radiated Spurious Emission	966-2	22~26°C/ 62~68%RH	5Vdc	2025/04/16~ 2025/06/16	WaterNil Guan
AC power Line Conducted Emission	SR1	23°C/ 66%RH	120Vac/ 60Hz	2025/06/26	WaterNil Guan

Sample Calculation:

Antenna Port Conducted Measurement:

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

Radiated Spurious Emission:

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

AC power Line Conducted Emission:

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

6.4. Description of Available Antennas

Ant. No.	Transmitter Circuit	Frequency Range	Brand Name	Model Name	Maximum Gain (dBi)	Ant. Type	Connector Type
1/2	Chain 1/0	2400 ~ 2483.5MHz 5150 ~ 5875MHz	ARLO	2APLE18300435	2.4GHz: 3.8 5GHz: 4.2	Internal, Metal	None

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
	802.11n (HT20)		OFDM	36 to 48	36, 44, 48	MCS0
	802.11a	5260-5320	OFDM	52 to 64	52, 60, 64	6 Mbps
	802.11n (HT20)		OFDM	52 to 64	52, 60, 64	MCS0
	802.11a	5500-5720	OFDM	100 to 144	100, 116, 140, 144	6 Mbps
	802.11n (HT20)		OFDM	100 to 144	100, 116, 140, 144	MCS0
	802.11a	5745-5825	OFDM	149 to 165	149, 157, 165	6 Mbps
	802.11n (HT20)		OFDM	149 to 165	149, 157, 165	MCS0
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
Radiated Emissions (Below 1GHz)	802.11a	5180-5240	OFDM	36 to 48	48	6 Mbps
AC Power Line Conducted Emission	802.11n (HT20)	5180-5240	OFDM	36 to 48	44	MCS0
Antenna Port Conducted Measurement	802.11a	5180-5240	OFDM	36 to 48	36, 44, 48	6 Mbps
	802.11n (HT20)		OFDM	36 to 48	36, 44, 48	MCS0
	802.11a	5260-5320	OFDM	52 to 64	52, 60, 64	6 Mbps
	802.11n (HT20)		OFDM	52 to 64	52, 60, 64	MCS0
	802.11a	5500-5720	OFDM	100 to 144	100, 116, 140, 144	6 Mbps
	802.11n (HT20)		OFDM	100 to 144	100, 116, 140, 144	MCS0
	802.11a	5745-5825	OFDM	149 to 165	149, 157, 165	6 Mbps
	802.11n (HT20)		OFDM	149 to 165	149, 157, 165	MCS0

- The EUT supports 802.11a and 802.11n (HT20) with 1Tx diversity, utilizing transmitter ports Chain 0 (ANT2) and Chain 1 (ANT1). The highest conducted output power was observed on Chain 0 (ANT2); therefore, only the test data from this chain is included in the report.
- 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 EUT has 2 types of Battery: 3.89Vdc-5655mAh(A-23) for VMC5050 and 3.6Vdc-13000mAh(A-14) for VMC5052, above types were pre-tested, the worst case was found in the 3.89Vdc-5655mAh(A-23) for VMC5050, and therefore the AC conduction was performed using this worst-case mode.

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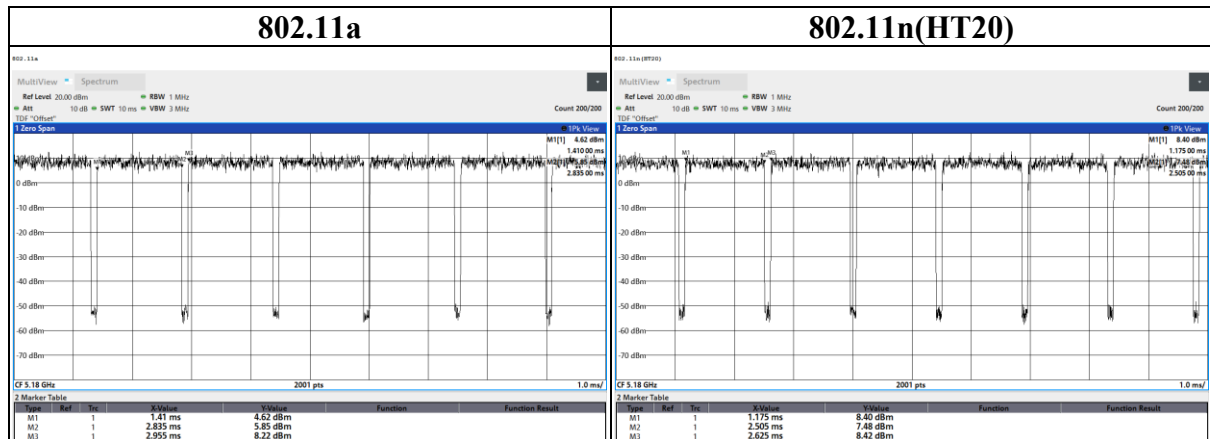
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- The radiated spurious emission test was performed in all test modes. The worst case were 802.11a, and therefore, only the worst case data is shown in this report to represent all test modes.
- In the transmit mode, 802.11n(HT20) channel 44 has the highest RF output power. Therefore, the AC conduction was performed using this worst-case mode."
- 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).

6.6. Duty cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle	Duty Factor (dB)	VBW Set (above 1GHz)
802.11a	1.425	1.545	0.9223	0.35	1kHz
802.11n(HT20)	1.330	1.450	0.9172	0.38	1kHz



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	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
				2025/5/12	2026/5/11
Preamplifier (1-18 GHz)	EMCI	EMC051835BE	980406	2025/1/13	2026/1/12
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	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	2025/5/27	2026/5/26
Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	2024/8/29	2025/8/28
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_EMG	UL-3A1.2

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8. Description of Test Setup

Tx Mode

Support Equipment

ID	Equipment	Brand Name	Model Name	S/N	Remark
A	Laptop	DELL	Latitude E5470	3JFKWF2	Provided by Lab
B	Mount	Arlo	Mount	N/A	Provided by Client

I/O Cables

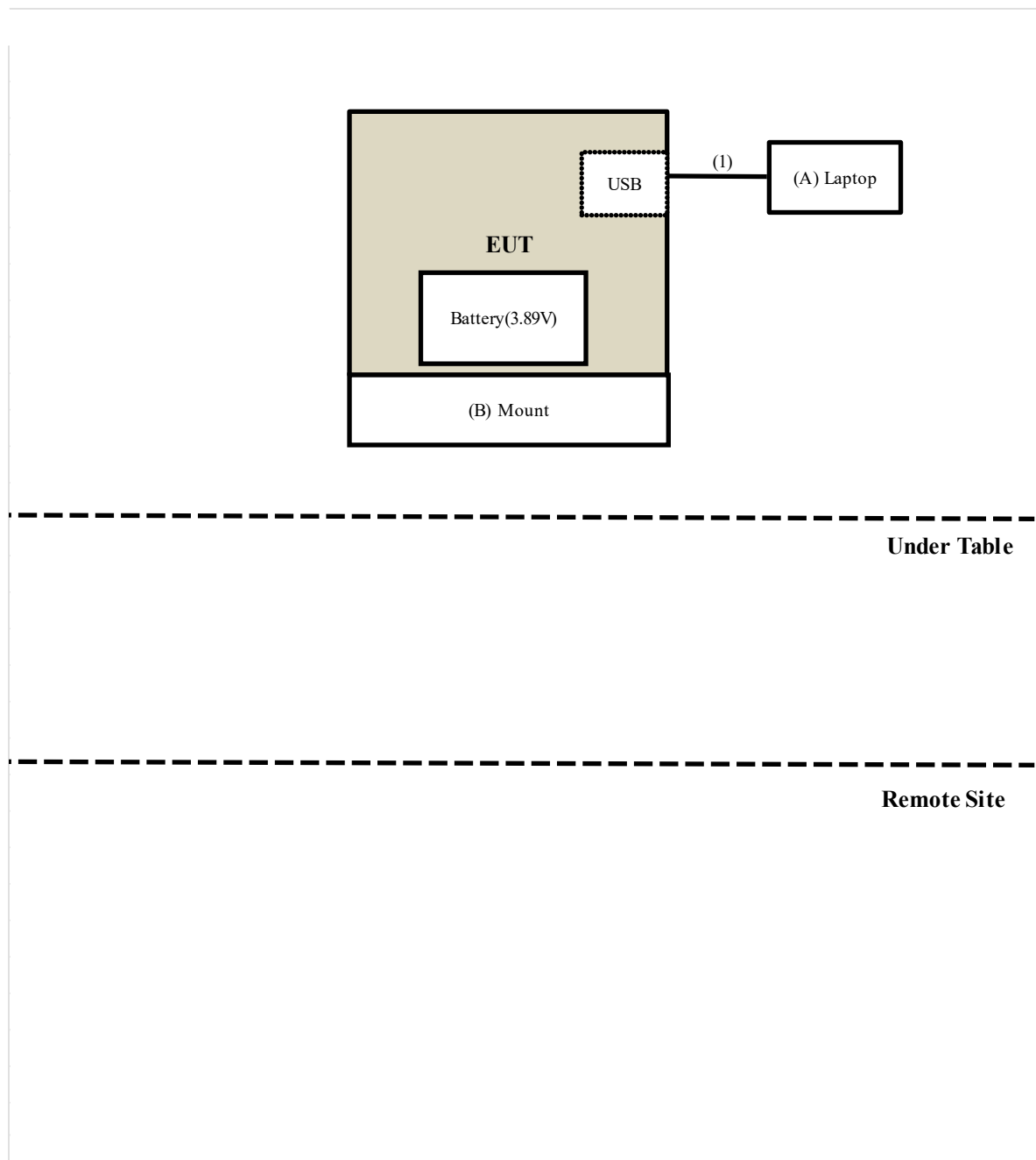
ID	Equipment	Brand Name	Model Name	Length (m)	Remark
1	USB Cable	Nienyi	310-50024-01	0.9	Provided by Client

Test Setup

Controlled using a bespoke application (Typing RF command by terminal tool(Tera Term version 4.94)) 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

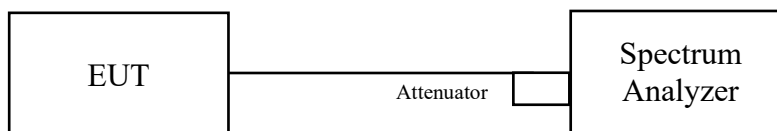
Requirements

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.

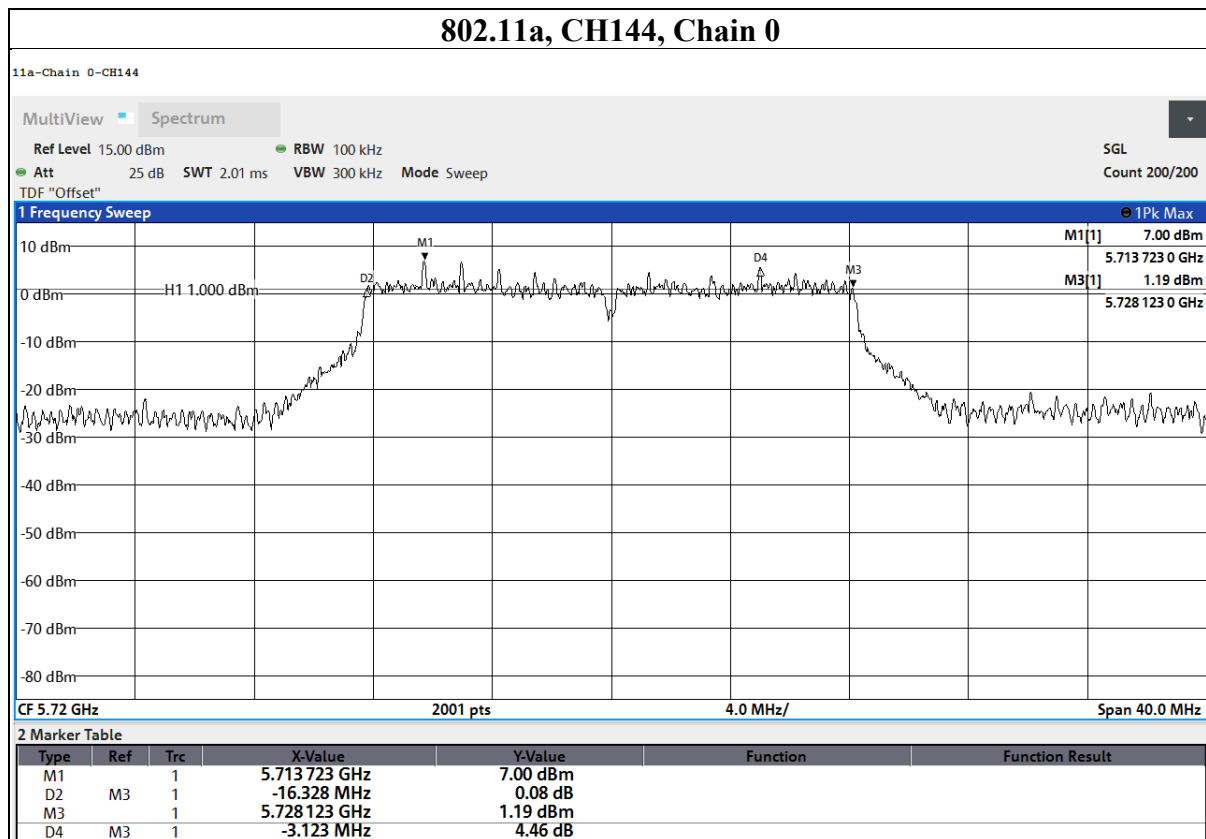
Test Setup



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		
802.11a	144 (U-NII-2C)	5720	13.205	0.5	PASS
	144 (U-NII-2C+U-NII-3)	5720	16.328	0.5	PASS
	144 (U-NII-3)	5720	3.123	0.5	PASS
	149	5745	16.325	0.5	PASS
	157	5785	16.328	0.5	PASS
	165	5825	16.338	0.5	PASS



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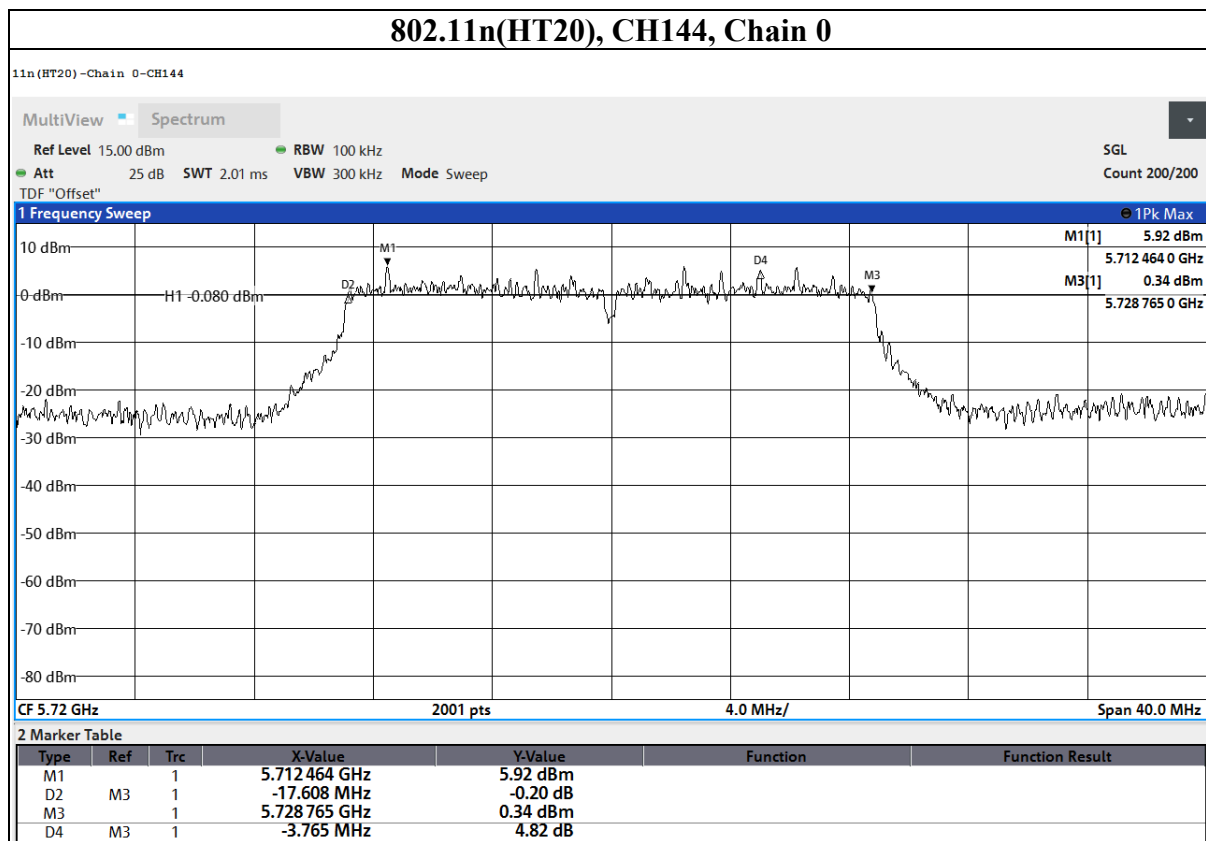
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Mode	CH	Freq (MHz)	6dB BW (MHz)	Limit (MHz)	Result
			Chain 0		
802.11n(HT20)	144 (U-NII-2C)	5720	13.843	0.5	PASS
	144 (U-NII-2C+U-NII-3)	5720	17.608	0.5	PASS
	144 (U-NII-3)	5720	3.765	0.5	PASS
	149	5745	17.323	0.5	PASS
	157	5785	17.612	0.5	PASS
	165	5825	17.582	0.5	PASS

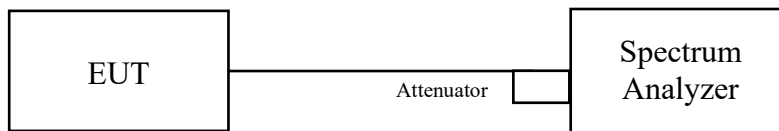


9.2. 26dB Bandwidth

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.

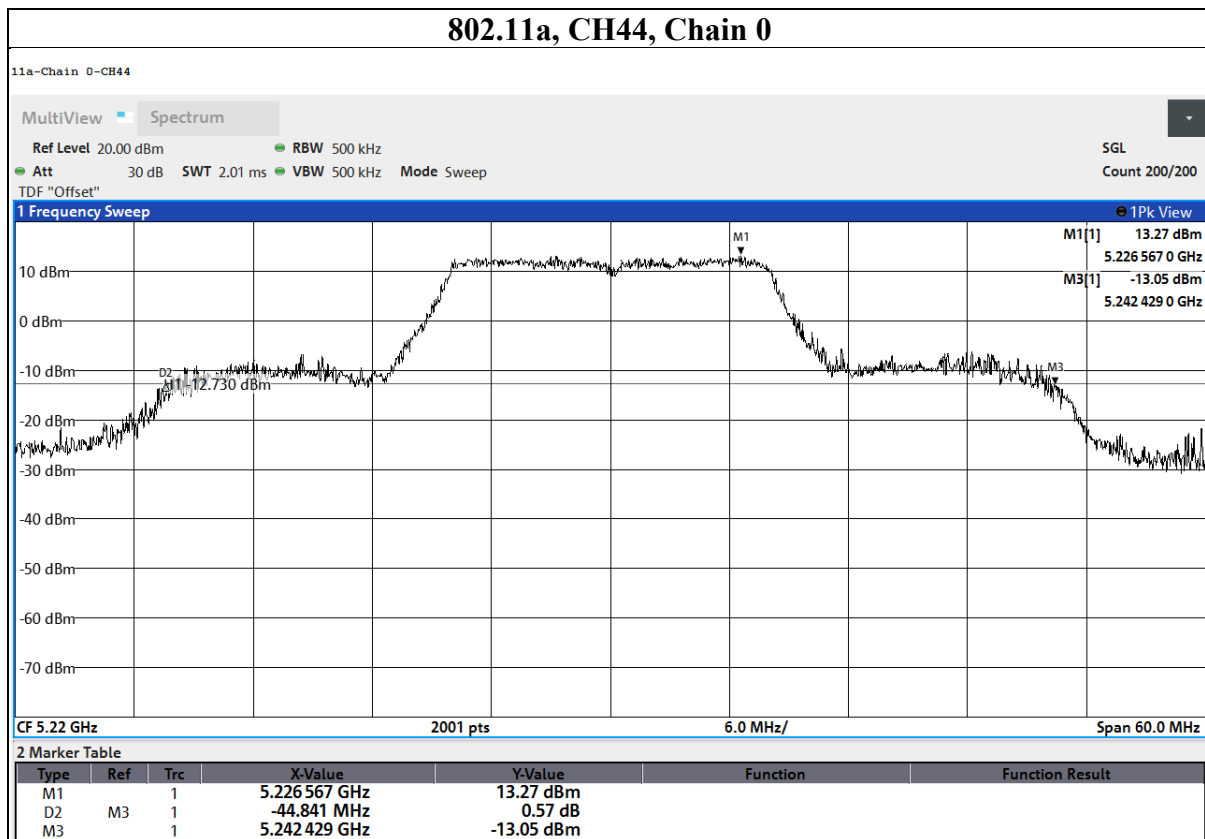
Test Setup



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		
802.11a	36	5180	21.09	N/A	PASS
	44	5220	44.841	N/A	PASS
	48	5240	44.198	N/A	PASS
	52	5260	44.747	N/A	PASS
	60	5300	44.297	N/A	PASS
	64	5320	43.662	N/A	PASS
	100	5500	44.534	N/A	PASS
	116	5580	43.569	N/A	PASS
	140	5700	38.977	N/A	PASS
	144 (U-NII-2C)	5720	23.242	N/A	PASS
	144 (U-NII-2C+U-NII-3)	5720	38.925	N/A	PASS
	144 (U-NII-3)	5720	15.683	N/A	PASS



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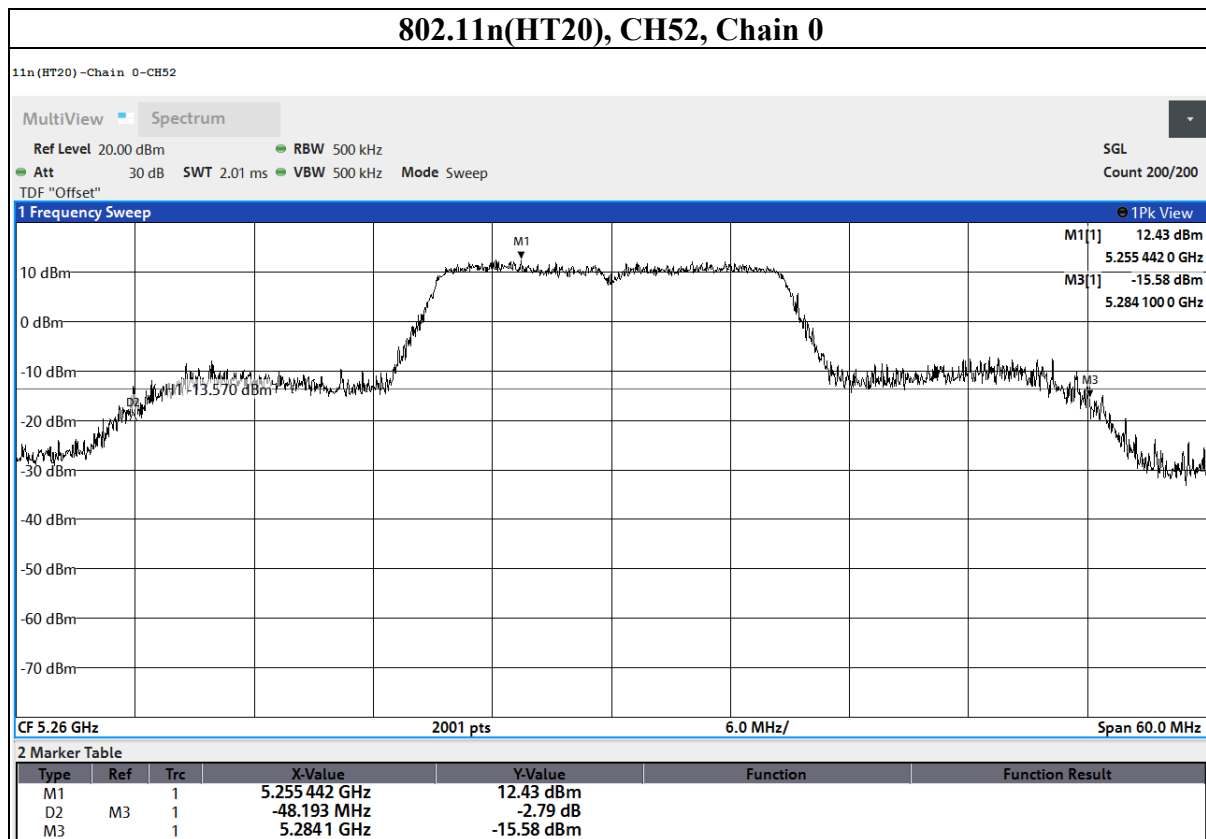
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Mode	CH	Freq (MHz)	26dB BW (MHz)	Limit (MHz)	Result
			Chain 0		
802.11n(HT20)	36	5180	45.499	N/A	PASS
	44	5220	48.123	N/A	PASS
	48	5240	47.591	N/A	PASS
	52	5260	48.193	N/A	PASS
	60	5300	47.286	N/A	PASS
	64	5320	46.757	N/A	PASS
	100	5500	47.927	N/A	PASS
	116	5580	46.867	N/A	PASS
	140	5700	45.317	N/A	PASS
	144 (U-NII-2C)	5720	26.391	N/A	PASS
	144 (U-NII-2C+U-NII-3)	5720	44.495	N/A	PASS
	144 (U-NII-3)	5720	18.104	N/A	PASS

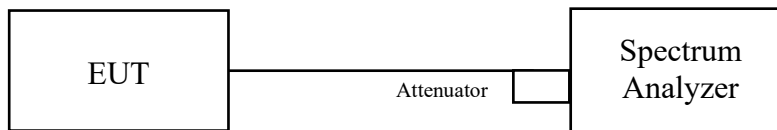


9.3. Occupied Bandwidth

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		
802.11a	36	5180	17.957	N/A	PASS
	44	5220	19.961	N/A	PASS
	48	5240	18.966	N/A	PASS
	52	5260	19.185	N/A	PASS
	60	5300	18.932	N/A	PASS
	64	5320	18.462	N/A	PASS
	100	5500	19.707	N/A	PASS
	116	5580	18.569	N/A	PASS
	140	5700	18.374	N/A	PASS
	144 (U-NII-2C)	5720	14.133	N/A	PASS
	144 (U-NII-2C+U-NII-3)	5720	18.282	N/A	PASS
	144 (U-NII-3)	5720	4.149	N/A	PASS
	149	5745	18.284	N/A	PASS
	157	5785	18.488	N/A	PASS
	165	5825	18.434	N/A	PASS

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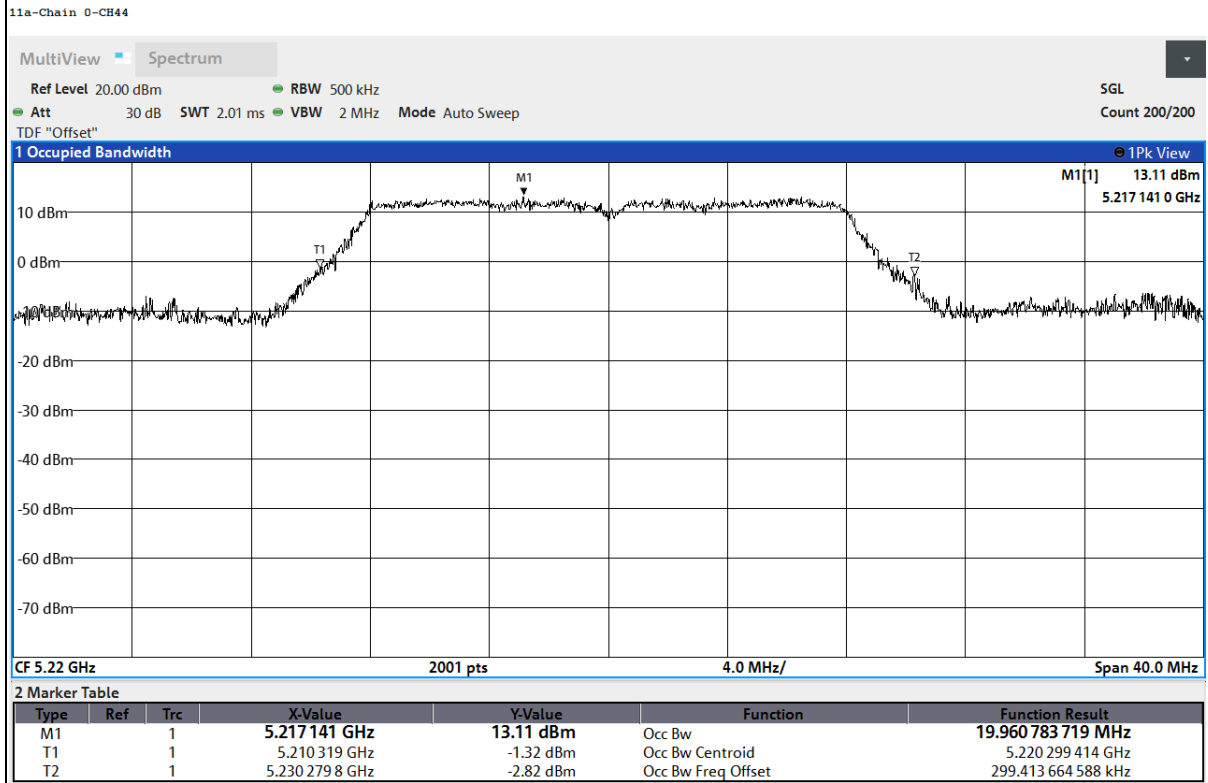
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802.11a, CH44, Chain 0



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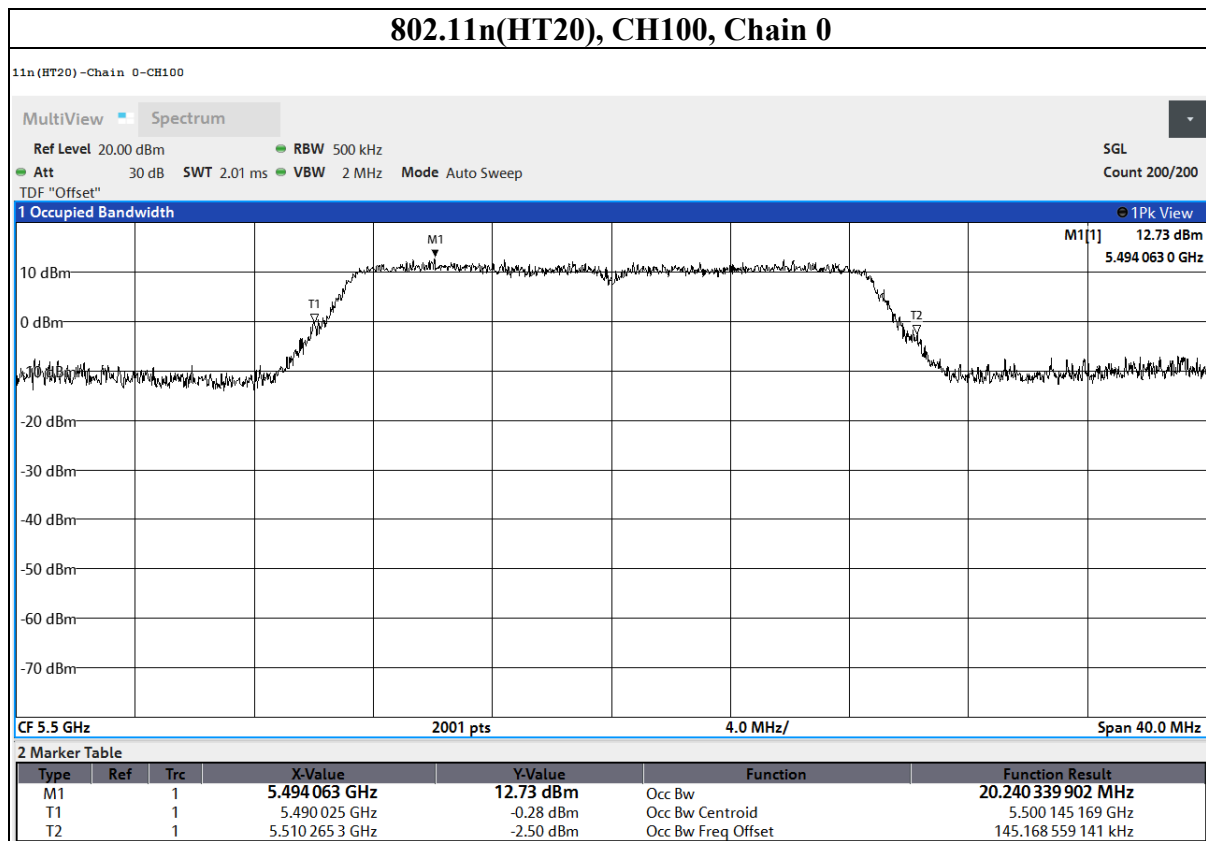
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Mode	CH	Freq (MHz)	OBW (MHz)	Limit (MHz)	Result
			Chain 0		
802.11n(HT20)	36	5180	18.933	N/A	PASS
	44	5220	20.026	N/A	PASS
	48	5240	19.802	N/A	PASS
	52	5260	19.546	N/A	PASS
	60	5300	19.426	N/A	PASS
	64	5320	19.362	N/A	PASS
	100	5500	20.24	N/A	PASS
	116	5580	19.299	N/A	PASS
	140	5700	19.07	N/A	PASS
	144 (U-NII-2C)	5720	14.52	N/A	PASS
	144 (U-NII-2C+U-NII-3)	5720	19.021	N/A	PASS
	144 (U-NII-3)	5720	4.501	N/A	PASS
	149	5745	19.04	N/A	PASS
	157	5785	19.224	N/A	PASS
	165	5825	19.119	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 $\leq$ 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$
		Fixed point-to-point Access Point	1 Watt (30 dBm) If $G_{TX} > 23$ dBi, then $P_{Out} = 30 - (G_{TX} - 23)$
		Indoor Access Point	1 Watt (30 dBm) If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$
	√	Client device	250mW (24 dBm) If $G_{TX} > 6$ dBi, then $P_{Out} = 23.98 - (G_{TX} - 6)$
U-NII-2A	√		250mW (24 dBm) or 11 dBm+10 log B* If $G_{TX} > 6$ dBi, then $P_{Out} = 23.98 - (G_{TX} - 6)$
U-NII-2C	√		250mW (24 dBm) or 11 dBm+10 log B* If $G_{TX} > 6$ dBi, then $P_{Out} = 23.98 - (G_{TX} - 6)$
U-NII-3	√		For Point-to-multipoint systems (P2M): 1 Watt (30 dBm). If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$ For Point-to-point systems (P2P): 1 Watt (30 dBm)

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 = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{Gn/20})^2 / Nant]$ 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 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 $NANT \leq 4$;
 Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;
 Array Gain = $5 \log(NANT/NSS)$ dB or 3 dB, whichever is less for 20-MHz channel widths with $NANT \geq 5$.
 Example: Maximum antenna gain = 5 dBi and $NANT \leq 4$, 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 = $20\text{dBm} * (5/20) = 13.97 \text{ dBm}$
 Calculation for UNII-3 Band Power = $20\text{dBm} * (15/20) = 18.75 \text{ dBm}$.

Test Procedure

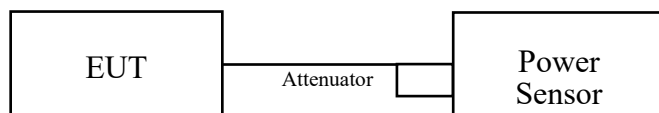
For Average Power Measurement

Test method PM

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

Test Setup

For Average Power Measurement



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

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Test Data

Mode	CH	Freq. (MHz)	AVG Power (dBm) Chain0	Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)	Result
802.11a	36	5180	18.25	66.834	18.25	23.98	22.45	30	Pass
	44	5220	20.61	115.08	20.61	23.98	24.81	30	Pass
	48	5240	20.54	113.24	20.54	23.98	24.74	30	Pass
	52	5260	20.4	109.648	20.4	23.98	24.6	30	Pass
	60	5300	20.32	107.647	20.32	23.98	24.52	30	Pass
	64	5320	20.23	105.439	20.23	23.98	24.43	30	Pass
	100	5500	20.38	109.144	20.38	23.98	24.58	30	Pass
	116	5580	19.75	94.406	19.75	23.98	23.95	30	Pass
	140	5700	19.33	85.704	19.33	23.98	23.53	30	Pass
	144	5720	19.02	79.799	19.02	23.98	23.22	30	Pass
	2c-144	5720	16.78	47.643	16.78	23.98	20.98	30	Pass
	3-144	5720	15.07	32.137	15.07	30	19.27	36.02	Pass
	149	5745	19.39	86.896	19.39	30	23.59	36.02	Pass
	157	5785	19.54	89.95	19.54	30	23.74	36.02	Pass
	165	5825	19.13	81.846	19.13	30	23.33	36.02	Pass
802.11n(HT20)	36	5180	18.21	66.222	18.21	23.98	22.41	30	Pass
	44	5220	20.7	117.49	20.7	23.98	24.9	30	Pass
	48	5240	20.65	116.145	20.65	23.98	24.85	30	Pass
	52	5260	20.58	114.288	20.58	23.98	24.78	30	Pass
	60	5300	20.5	112.202	20.5	23.98	24.7	30	Pass
	64	5320	20.27	106.414	20.27	23.98	24.47	30	Pass
	100	5500	20.42	110.154	20.42	23.98	24.62	30	Pass
	116	5580	19.78	95.06	19.78	23.98	23.98	30	Pass
	140	5700	19.31	85.31	19.31	23.98	23.51	30	Pass
	144	5720	19	79.433	19	23.98	23.2	30	Pass
	2c-144	5720	16.73	47.098	16.73	23.98	20.93	30	Pass
	3-144	5720	15.09	32.285	15.09	30	19.29	36.02	Pass
	149	5745	19.31	85.31	19.31	30	23.51	36.02	Pass
	157	5785	19.49	88.92	19.49	30	23.69	36.02	Pass
	165	5825	19.11	81.47	19.11	30	23.31	36.02	Pass

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

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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

Note:

- PSD = power spectral density that he 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
- G_{TX} = the maximum transmitting antenna directional gain in dBi.
- If EUT with Multiple Transmitter Output:
 - 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
 - "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.
 - 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.
- Refer to section 6.6 for duty cycle spectrum plot. (If duty cycle<98%)

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Test procedure

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

Using method as below:

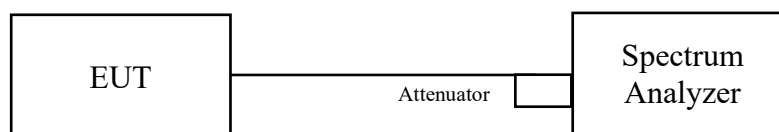
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 1 MHz, Set VBW $\geq$ 3 RBW, Detector = RMS
- Sweep time = auto, trigger set to “free run”.
- Trace average at least 100 traces in power averaging mode.
- Record the max value. (if Duty cycle <98 %, add 10 log (1/duty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

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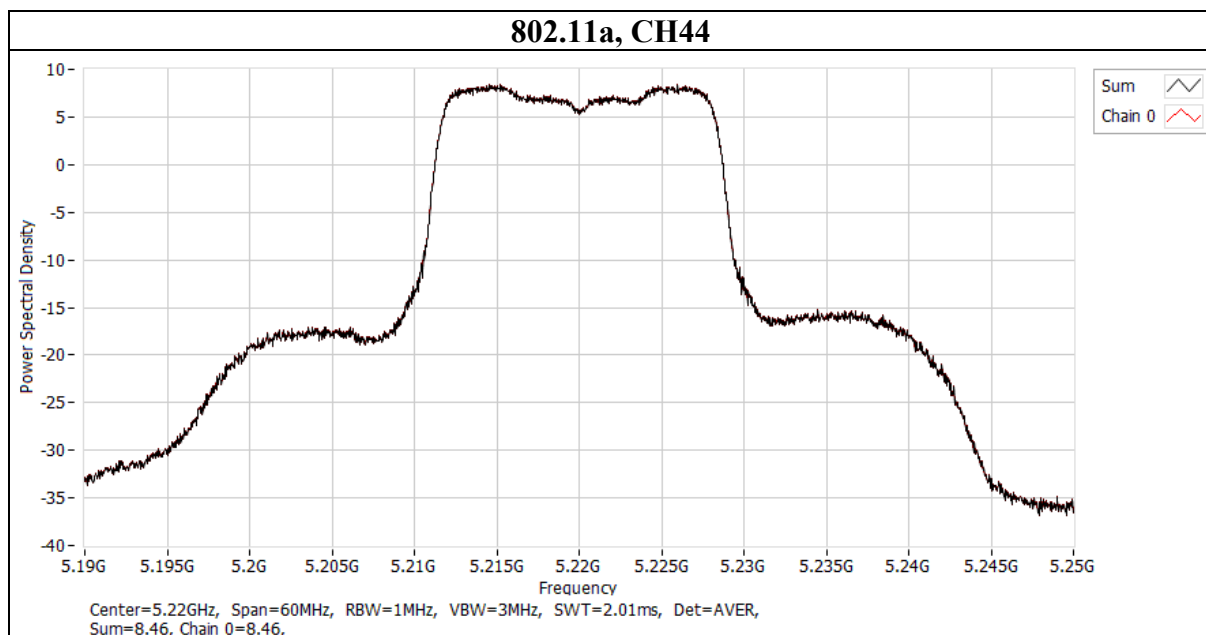
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Test Data

Mode (U-NII-1)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11a	36	5180	4.2	6.46	11	PASS
	44	5220	4.2	8.46	11	PASS
	48	5240	4.2	7.81	11	PASS

Mode (U-NII-1)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)
			Chain 0
802.11a	36	5180	6.46
	44	5220	8.46
	48	5240	7.81



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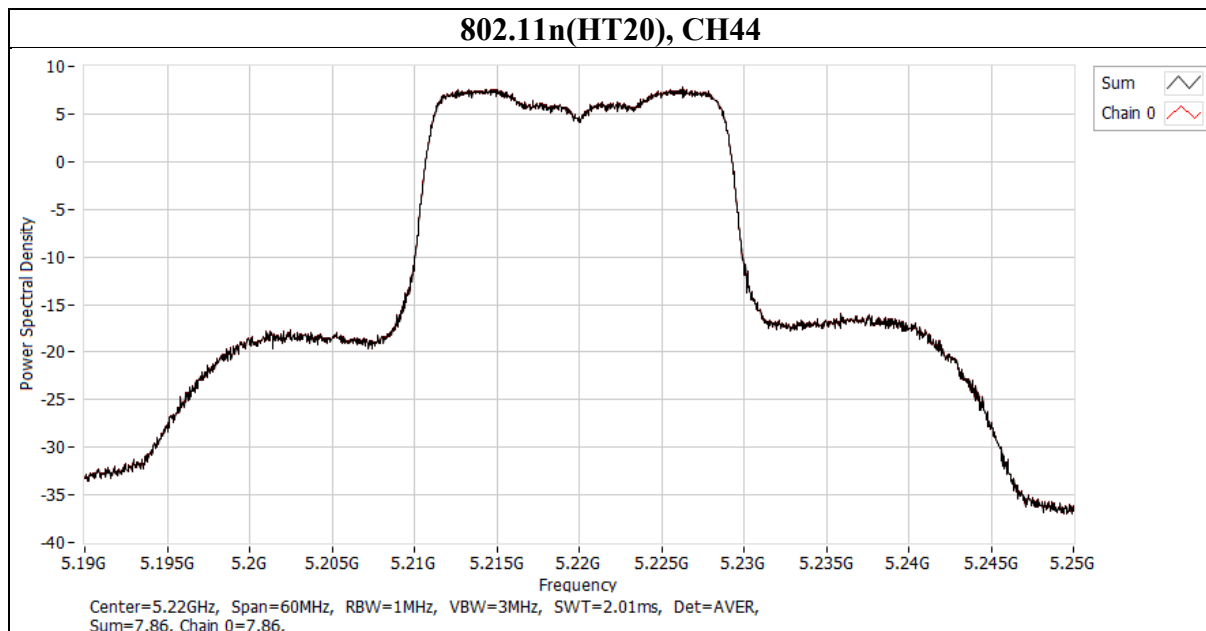
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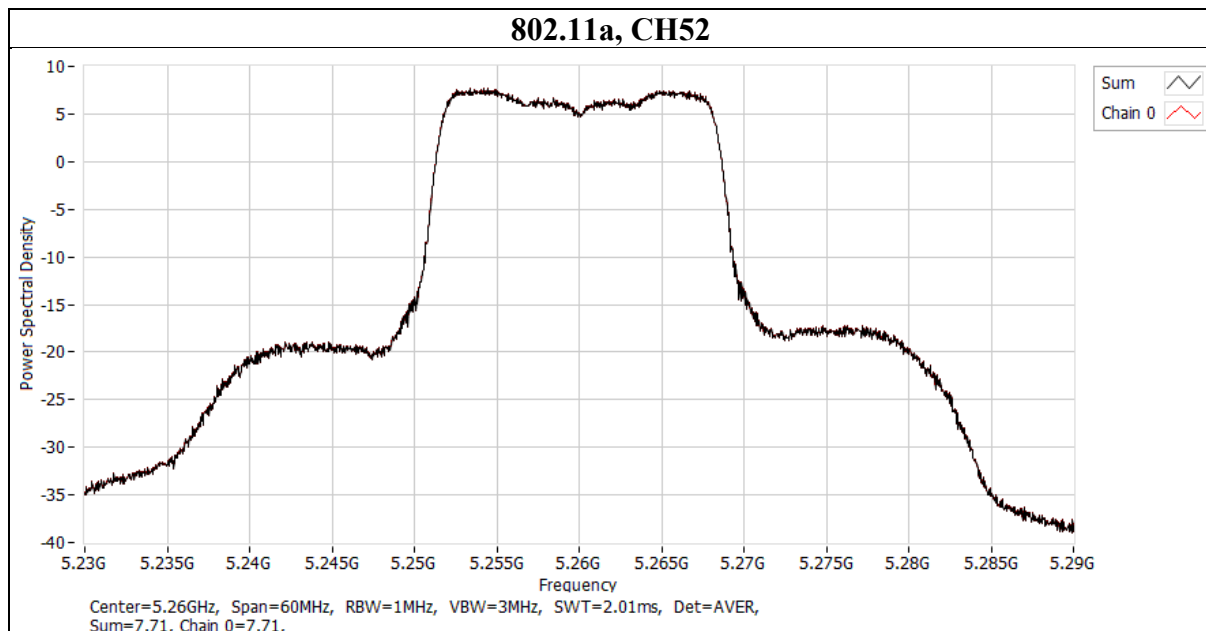
Mode (U-NII-1)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11n(HT20)	36	5180	4.2	6.75	11	PASS
	44	5220	4.2	7.86	11	PASS
	48	5240	4.2	7.62	11	PASS

Mode (U-NII-1)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)
			Chain 0
802.11n(HT20)	36	5180	6.75
	44	5220	7.86
	48	5240	7.62



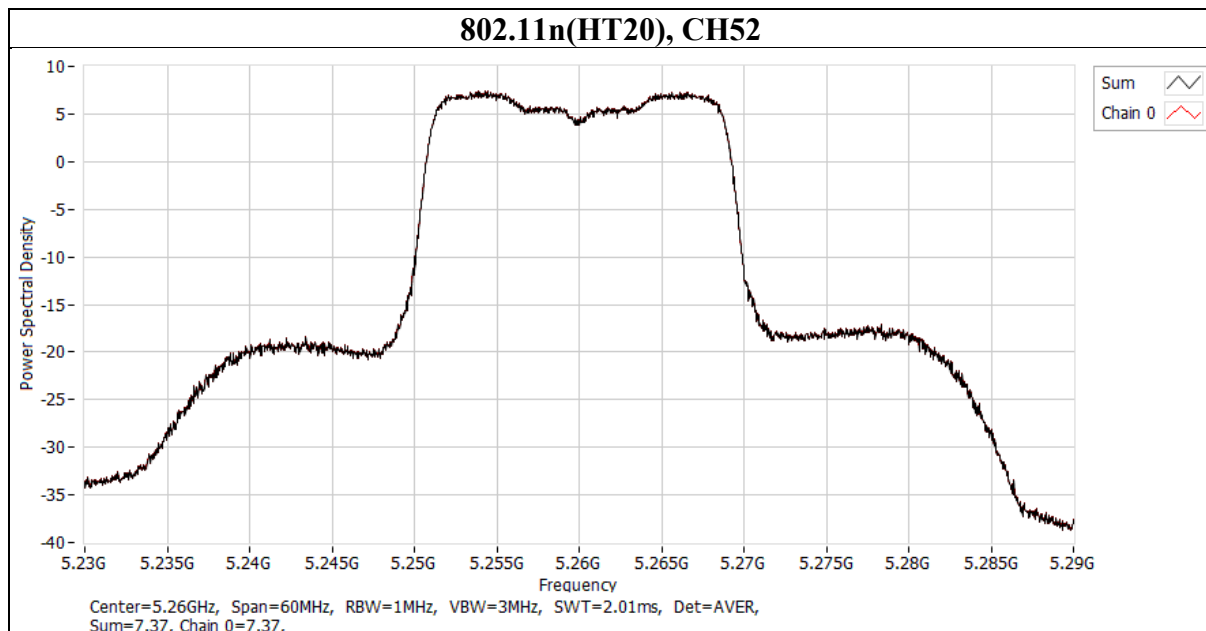
Mode (U-NII-2A)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11a	52	5260	4.2	7.71	11	PASS
	60	5300	4.2	7.44	11	PASS
	64	5320	4.2	7.3	11	PASS

Mode (U-NII-2A)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)
			Chain 0
802.11a	52	5260	7.71
	60	5300	7.44
	64	5320	7.3



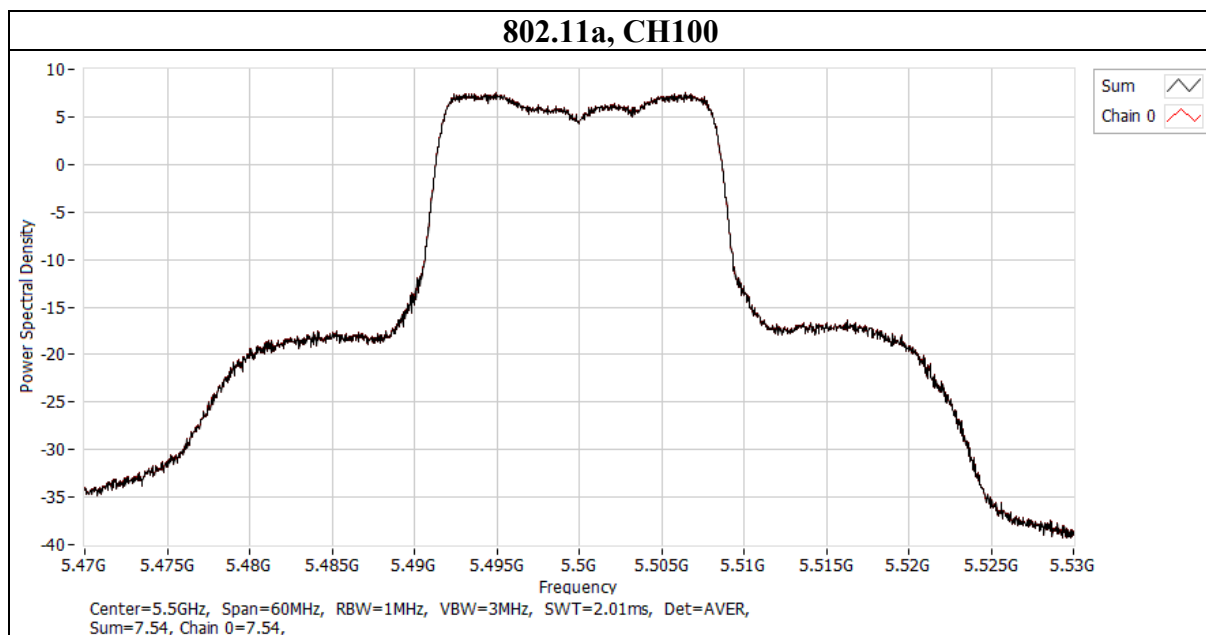
Mode (U-NII-2A)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11n(HT20)	52	5260	4.2	7.37	11	PASS
	60	5300	4.2	7.19	11	PASS
	64	5320	4.2	6.88	11	PASS

Mode (U-NII-2A)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)
			Chain 0
802.11n(HT20)	52	5260	7.37
	60	5300	7.19
	64	5320	6.88



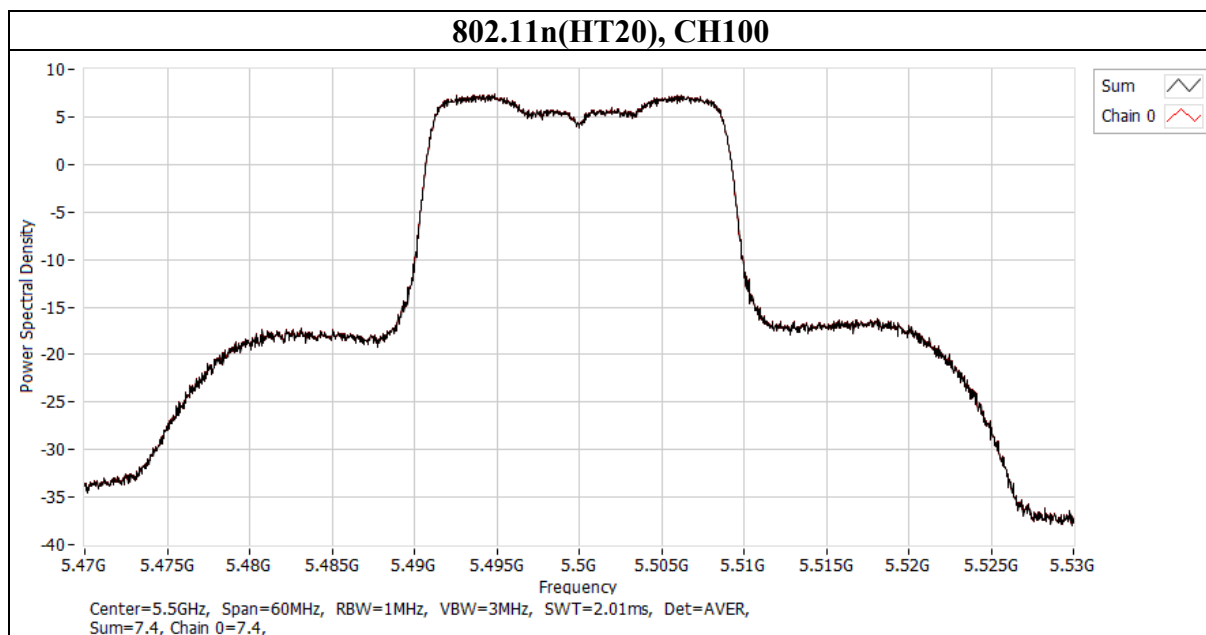
Mode (U-NII-2C)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11a	100	5500	4.2	7.54	11	PASS
	116	5580	4.2	6.47	11	PASS
	140	5700	4.2	6.09	11	PASS
	144	5720	4.2	5.92	11	PASS

Mode (U-NII-2C)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)
			Chain 0
802.11a	100	5500	7.54
	116	5580	6.47
	140	5700	6.09
	144	5720	5.92



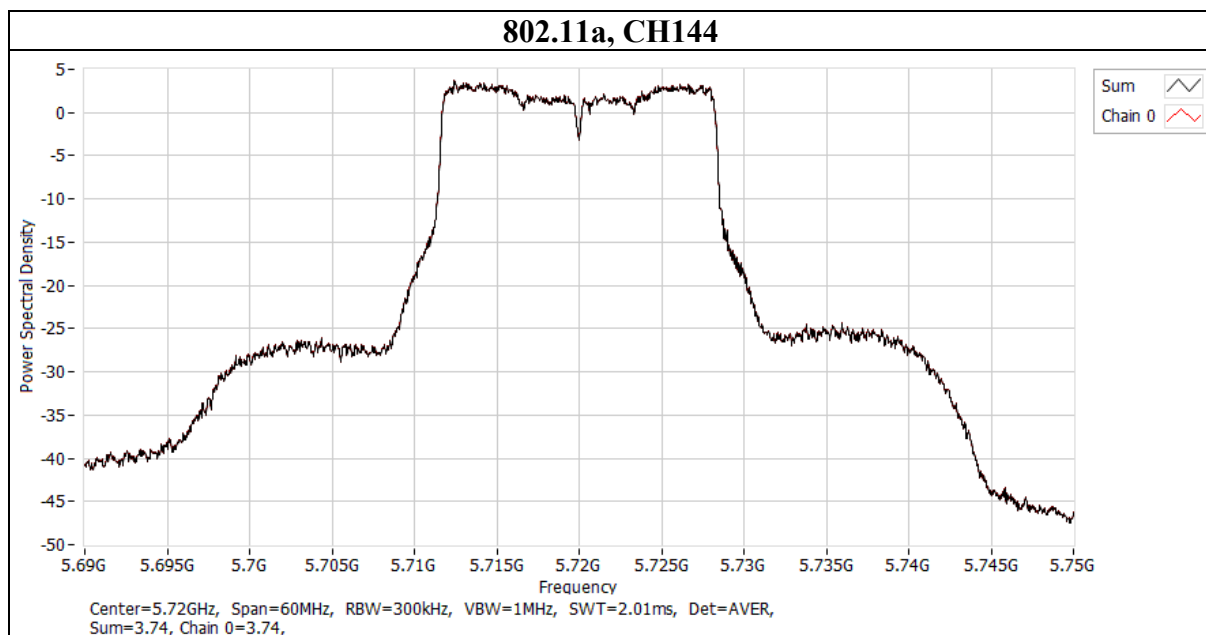
Mode (U-NII-2C)	CH	Freq (MHz)	Directional Gain (dBi)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11n(HT20)	100	5500	4.2	7.4	11	PASS
	116	5580	4.2	6.58	11	PASS
	140	5700	4.2	6.04	11	PASS
	144	5720	4.2	5.77	11	PASS

Mode (U-NII-2C)	CH	Freq (MHz)	PSD per Chain (dBm/MHz)
			Chain 0
802.11n(HT20)	100	5500	7.4
	116	5580	6.58
	140	5700	6.04
	144	5720	5.77



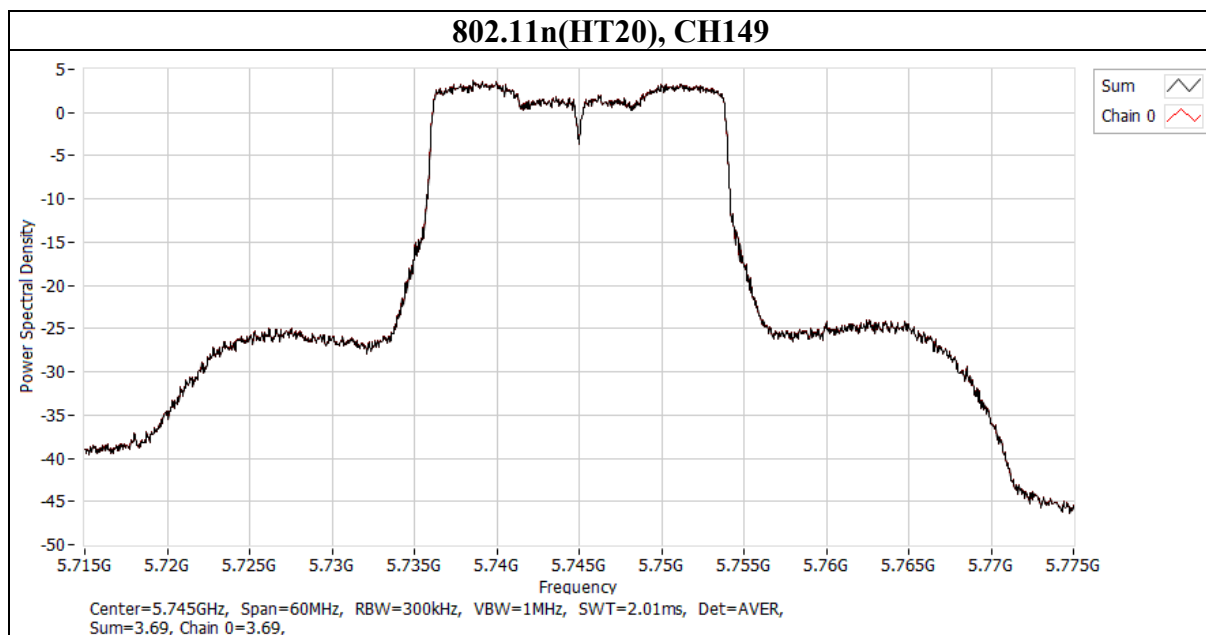
Mode (U-NII-3)	CH	Freq (MHz)	BWCF	Directional Gain (dBi)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
802.11a	144	5720	2.22	4.2	5.95	30	PASS
	149	5745	2.22	4.2	5.84	30	PASS
	157	5785	2.22	4.2	5.9	30	PASS
	165	5825	2.22	4.2	5.66	30	PASS

Mode (U-NII-3)	CH	Freq (MHz)	PSD per Chain (dBm/500kHz)
			Chain 0
802.11a	144	5720	3.74
	149	5745	3.62
	157	5785	3.68
	165	5825	3.44



Mode (U-NII-3)	CH	Freq (MHz)	BWCF	Directional Gain (dBi)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Result
802.11n(HT20)	144	5720	2.22	4.2	5.36	30	PASS
	149	5745	2.22	4.2	5.91	30	PASS
	157	5785	2.22	4.2	5.66	30	PASS
	165	5825	2.22	4.2	5.68	30	PASS

Mode (U-NII-3)	CH	Freq (MHz)	PSD per Chain (dBm/500kHz)
			Chain 0
802.11n(HT20)	144	5720	3.14
	149	5745	3.69
	157	5785	3.44
	165	5825	3.46



9.6. Frequency Stability

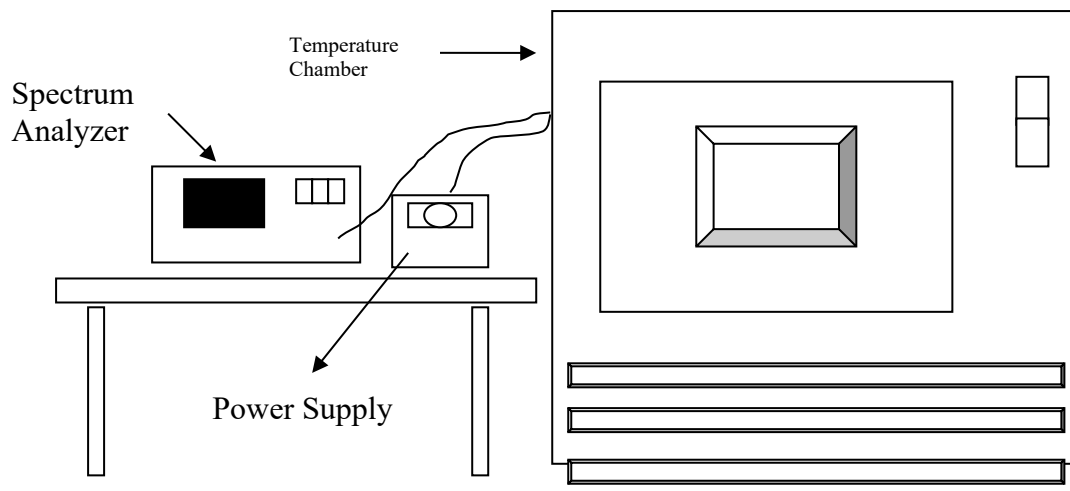
Requirements

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: 5500 MHz									
TEMP. (°C)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)
50	5	5499.9976	-0.44	5499.9974	-0.47	5499.9946	-0.98	5499.9964	-0.65
40	5	5499.9939	-1.11	5499.9972	-0.51	5499.996	-0.73	5499.9972	-0.51
30	5	5499.9727	-4.96	5499.974	-4.73	5499.9752	-4.51	5499.9747	-4.60
20	5	5500.0144	2.62	5500.0162	2.95	5500.0161	2.93	5500.0155	2.82
10	5	5499.9872	-2.33	5499.984	-2.91	5499.9871	-2.35	5499.9856	-2.62
0	5	5500.0001	0.02	5500.0033	0.60	5500.0033	0.60	5500.0025	0.45
-10	5	5500.024	4.36	5500.0246	4.47	5500.024	4.36	5500.0252	4.58
-20	5	5500.0255	4.64	5500.0239	4.35	5500.0244	4.44	5500.023	4.18
-30	5	5500.0246	4.47	5500.0213	3.87	5500.0245	4.45	5500.0235	4.27
TEMP. (°C)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)
20	5.75	5500.0152	2.76	5500.0153	2.78	5500.0152	2.76	5500.0163	2.96
20	5	5500.0144	2.62	5500.0162	2.95	5500.0161	2.93	5500.0155	2.82
20	4.25	5500.0141	2.56	5500.0156	2.84	5500.0154	2.80	5500.0161	2.93

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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.

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Limits of unwanted emission out of the restricted bands

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

Note:

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

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

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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:

- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 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.
- 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.

- 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.
- Test data of Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
- Test data of Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
- Test data of Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
- Test data of Notation "@" = Fundamental Frequency
- 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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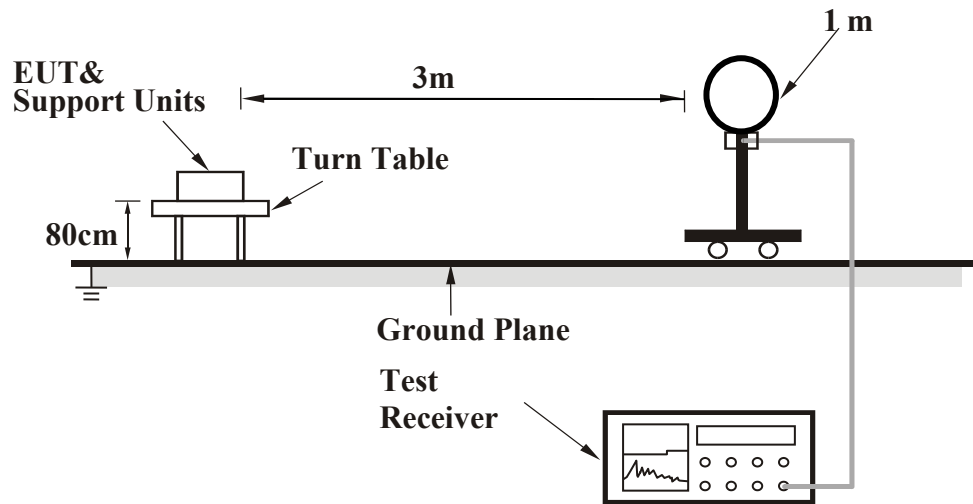
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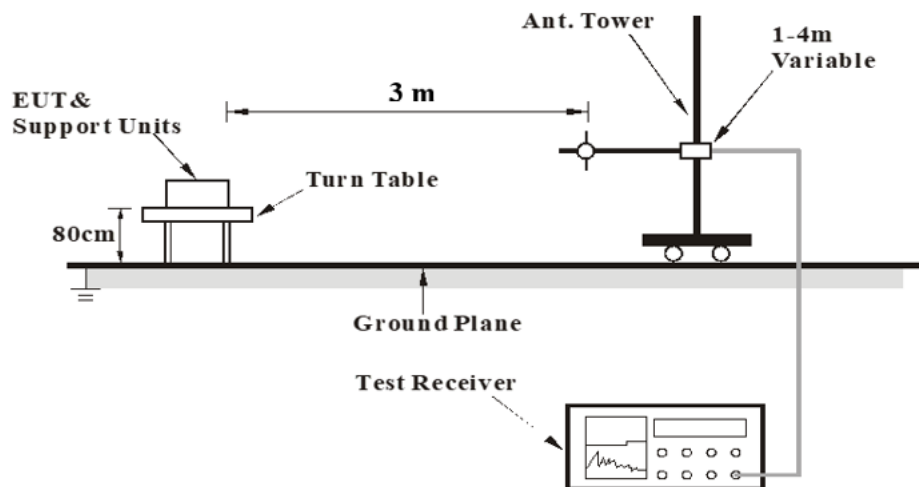
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Test Setup

<Frequency Range 9 kHz ~ 30 MHz>



<Frequency Range 30 MHz ~ 1 GHz>



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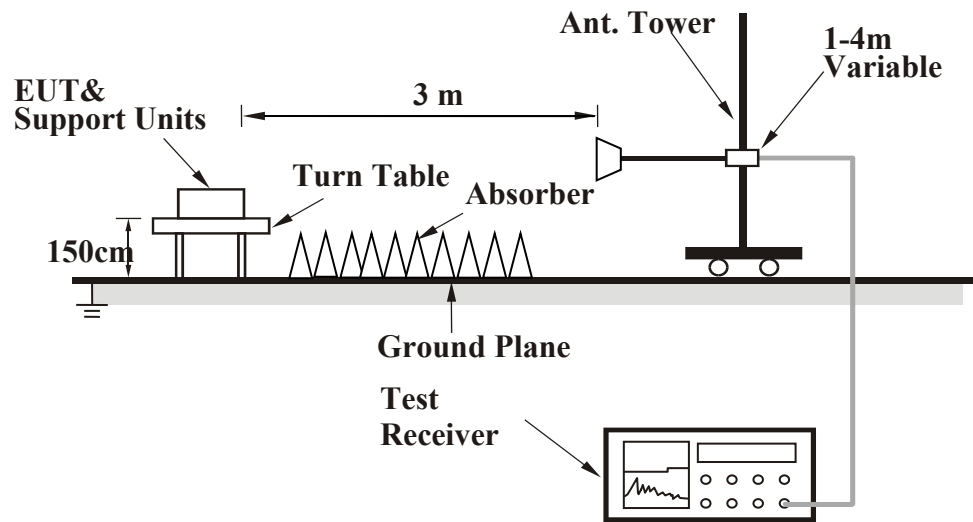
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<Frequency Range above 1 GHz>



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		5148.4	46.75	19.76	66.51	74	-7.49	PK
		5149.1	33.39	19.76	53.15	54	-0.85	AVG
	@	5180	86.37	19.67	106.04	N/A	N/A	PK
	@	5180	76.89	19.67	96.56	N/A	N/A	AVG
	*	10360	30.94	17.77	48.71	68.2	-19.49	PK
Vertical		5148.4	49.56	19.76	69.32	74	-4.68	PK
		5149.45	33.69	19.76	53.45	54	-0.55	AVG
	@	5180	88.02	19.67	107.69	N/A	N/A	PK
	@	5180	77.46	19.67	97.13	N/A	N/A	AVG
	*	10360	31.21	17.77	48.98	68.2	-19.22	PK

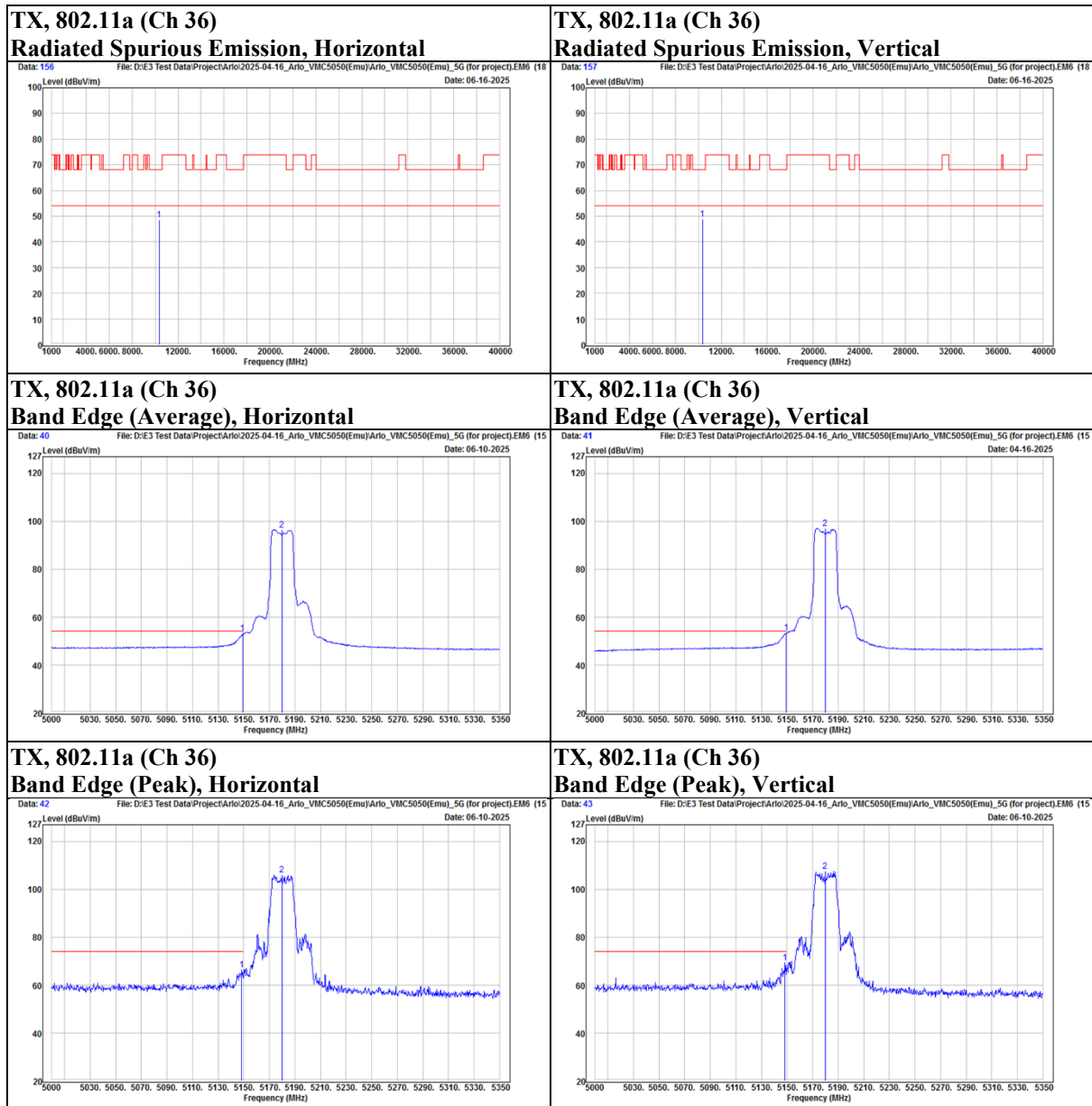
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Mode	802.11a	Channel	44
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		5107.8	29.98	19.67	49.65	54	-4.35	AVG
		5111.65	41.76	19.68	61.44	74	-12.56	PK
	@	5220	89.01	19.48	108.49	N/A	N/A	PK
	@	5220	78.87	19.48	98.35	N/A	N/A	AVG
	*	10440	31.01	18.13	49.14	68.2	-19.06	PK
Vertical		5113.75	41.61	19.68	61.29	74	-12.71	PK
		5123.55	29.97	19.71	49.68	54	-4.32	AVG
	@	5220	89.82	19.48	109.3	N/A	N/A	PK
	@	5220	80.54	19.48	100.02	N/A	N/A	AVG
	*	10440	30.96	18.13	49.09	68.2	-19.11	PK

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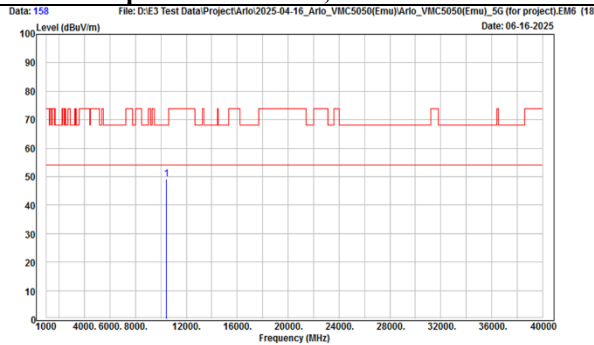
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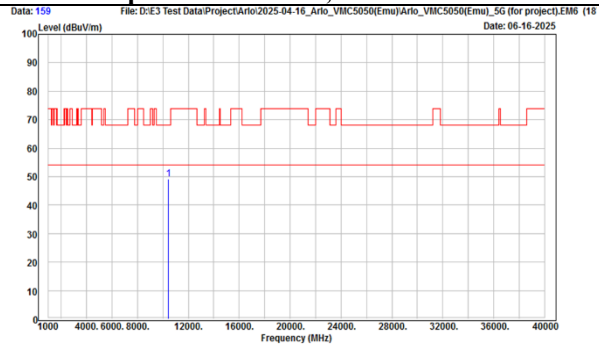
TX, 802.11a (Ch 44)

Radiated Spurious Emission, Horizontal



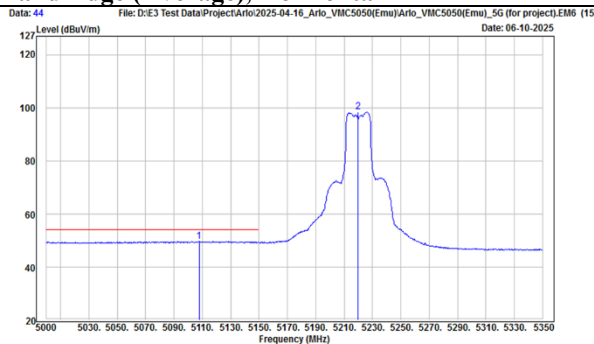
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Radiated Spurious Emission, Vertical



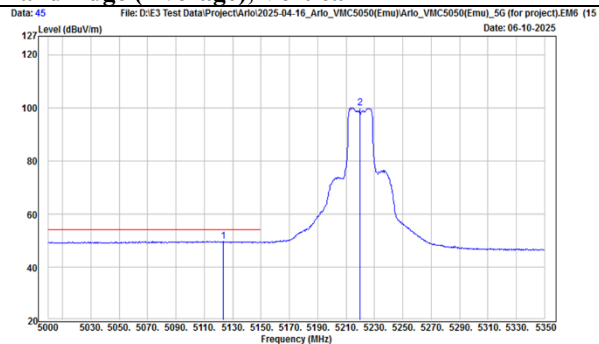
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Band Edge (Average), Horizontal



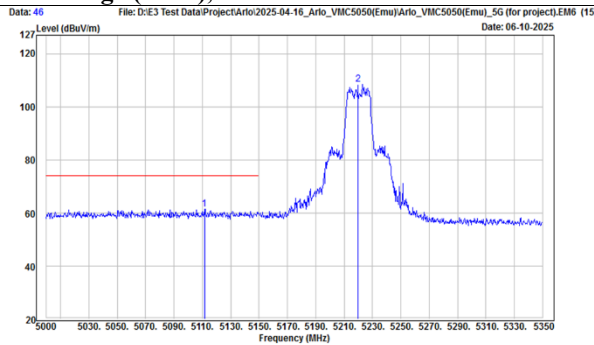
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Band Edge (Average), Vertical



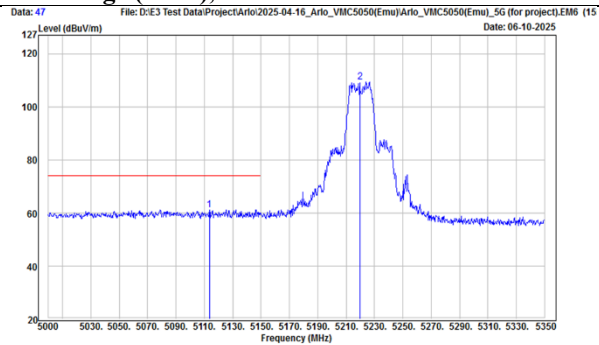
TX, 802.11a (Ch 44)

Band Edge (Peak), Horizontal



TX, 802.11a (Ch 44)

Band Edge (Peak), Vertical



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		5011.55	42.95	19.16	62.11	74	-11.89	PK
		5112.7	29.92	19.68	49.6	54	-4.4	AVG
	@	5240	88.25	19.35	107.6	N/A	N/A	PK
	@	5240	78.7	19.35	98.05	N/A	N/A	AVG
	*	10480	31.23	18.26	49.49	68.2	-18.71	PK
Vertical		5095.55	42	19.64	61.64	74	-12.36	PK
		5136.85	29.93	19.73	49.66	54	-4.34	AVG
	@	5240	90.25	19.35	109.6	N/A	N/A	PK
	@	5240	81.07	19.35	100.42	N/A	N/A	AVG
	*	10480	30.67	18.26	48.93	68.2	-19.27	PK

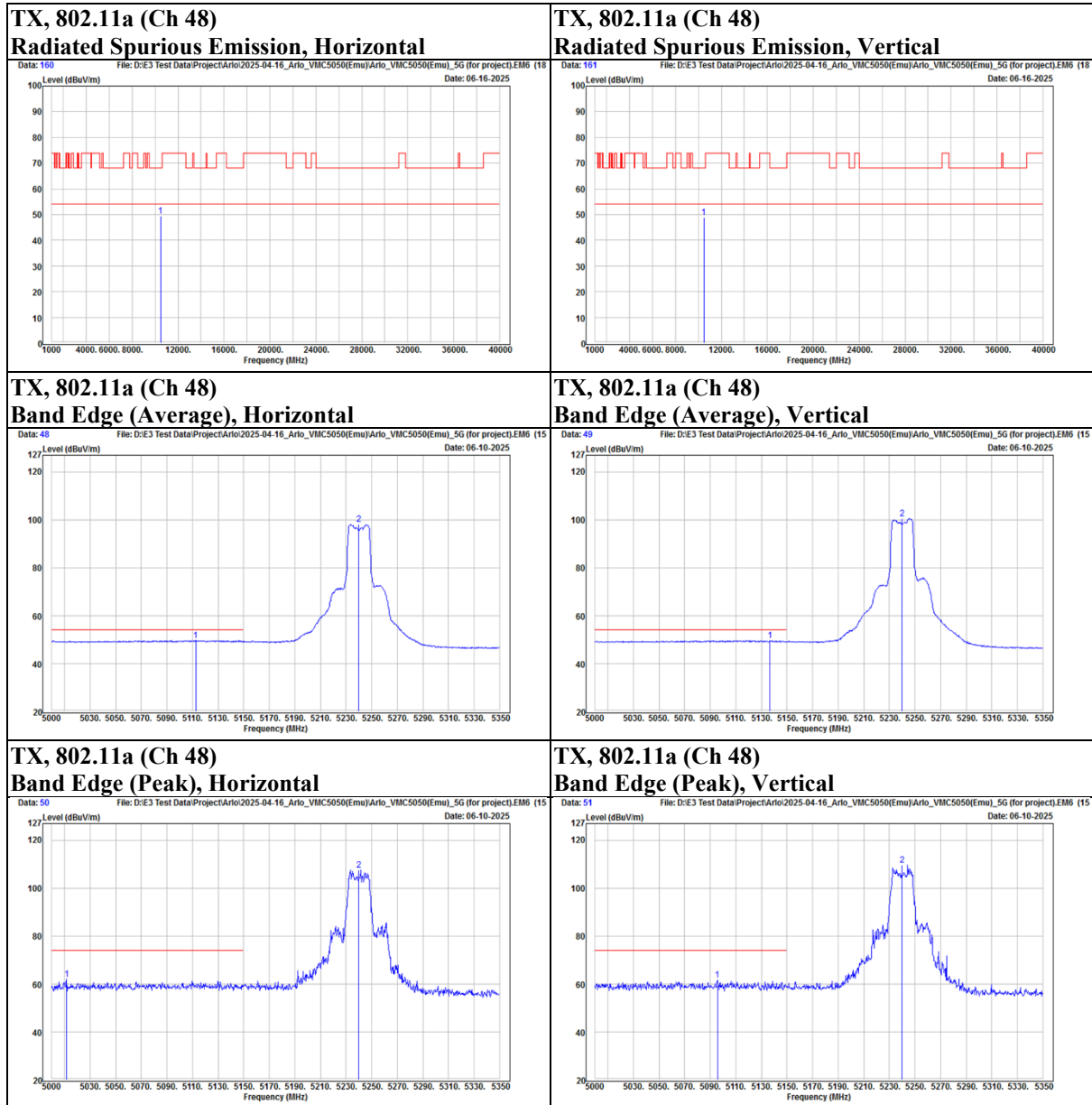
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Mode	802.11a	Channel	52
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	@	5260	88.17	19.24	107.41	N/A	N/A	PK
	@	5260	78.62	19.24	97.86	N/A	N/A	AVG
		5407.5	39.35	19.66	59.01	74	-14.99	PK
		5459.4	27.83	19.95	47.78	54	-6.22	AVG
	*	10520	29.73	18.3	48.03	68.2	-20.17	PK
Vertical	@	5260	89.6	19.24	108.84	N/A	N/A	PK
	@	5260	81.27	19.24	100.51	N/A	N/A	AVG
		5401.5	40.34	19.64	59.98	74	-14.02	PK
		5458.2	27.96	19.94	47.9	54	-6.1	AVG
	*	10520	31.09	18.3	49.39	68.2	-18.81	PK

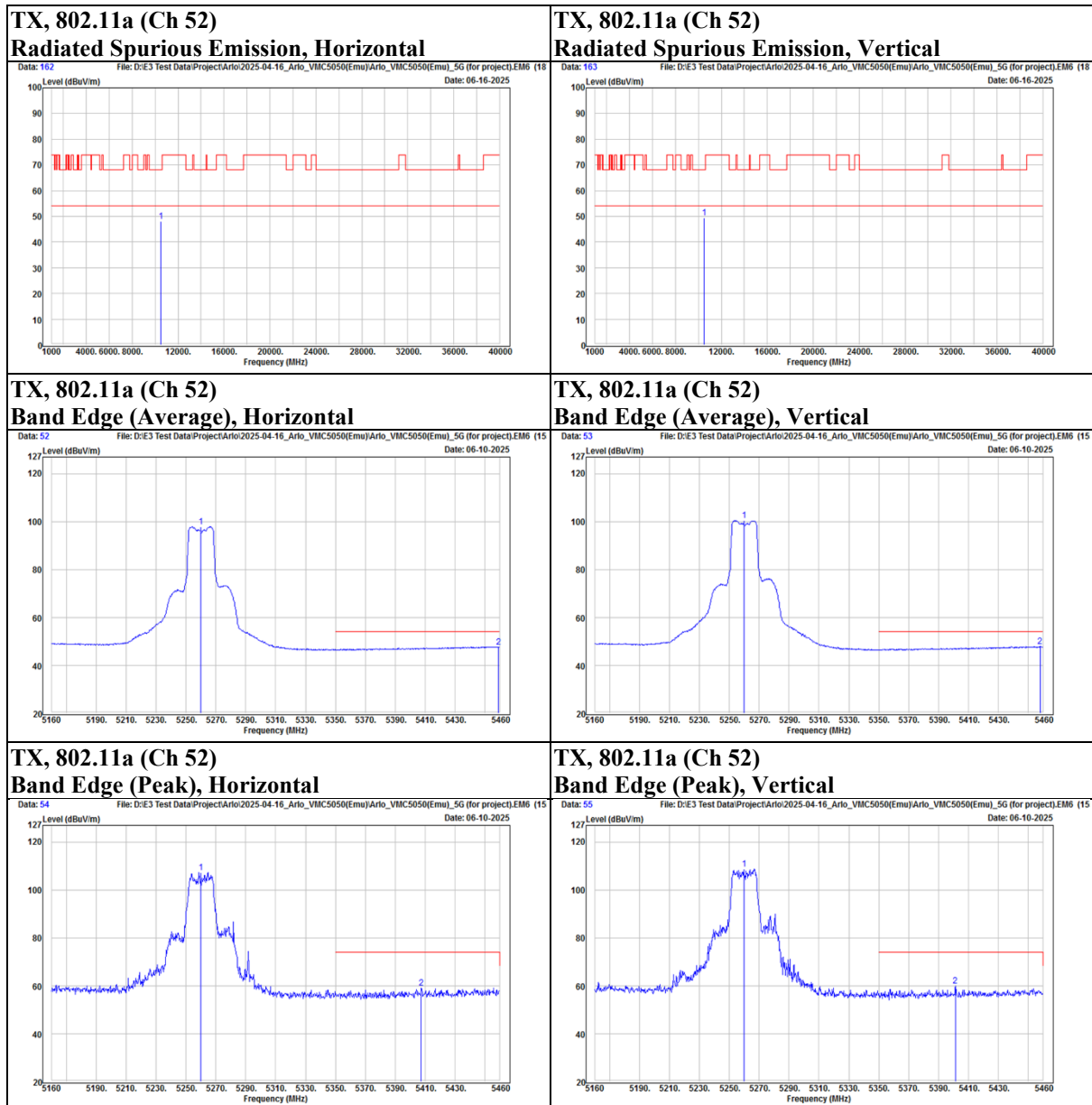
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Mode	802.11a	Channel	60
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	@	5300	86.99	19.08	106.07	N/A	N/A	PK
	@	5300	78.79	19.08	97.87	N/A	N/A	AVG
		5449.2	39.4	19.9	59.3	74	-14.7	PK
		5459.1	27.87	19.95	47.82	54	-6.18	AVG
	*	10600	30.9	18.22	49.12	74	-24.88	PK
Vertical	@	5300	90.92	19.08	110	N/A	N/A	PK
	@	5300	81.71	19.08	100.79	N/A	N/A	AVG
		5425.2	39.19	19.77	58.96	74	-15.04	PK
		5458.8	27.86	19.94	47.8	54	-6.2	AVG
	*	10600	32.07	18.22	50.29	74	-23.71	PK

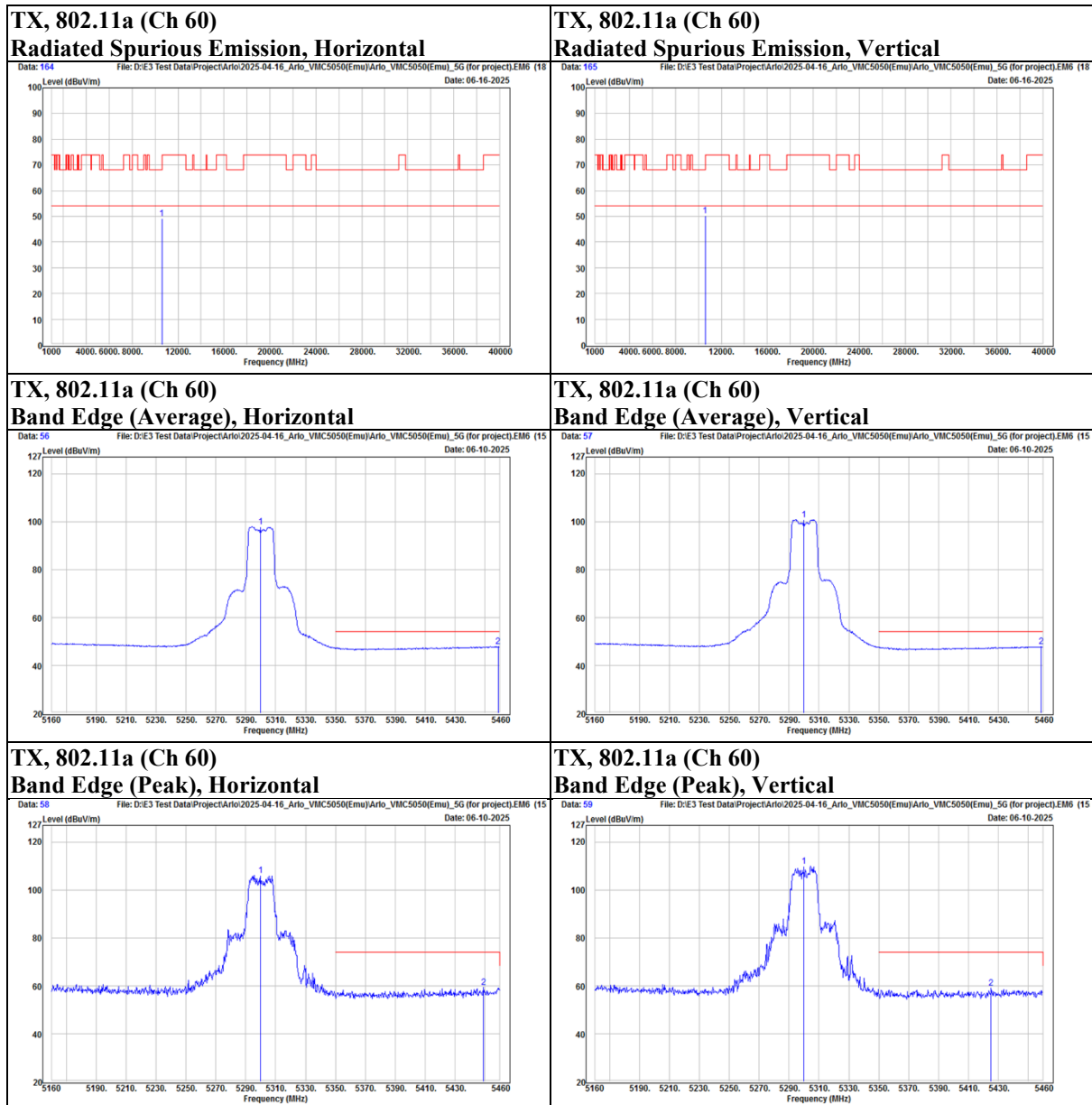
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Mode	802.11a	Channel	64
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	@	5320	87.31	19.17	106.48	N/A	N/A	PK
	@	5320	78.45	19.17	97.62	N/A	N/A	AVG
		5350.2	32.71	19.29	52	54	-2	AVG
		5352.3	46.22	19.3	65.52	74	-8.48	PK
	*	10640	30.83	18.35	49.18	74	-24.82	PK
Vertical	@	5320	91.34	19.17	110.51	N/A	N/A	PK
	@	5320	79.4	19.17	98.57	N/A	N/A	AVG
		5351.1	33.62	19.3	52.92	54	-1.08	AVG
		5352.3	52.75	19.3	72.05	74	-1.95	PK
	*	10640	30.6	18.35	48.95	74	-25.05	PK

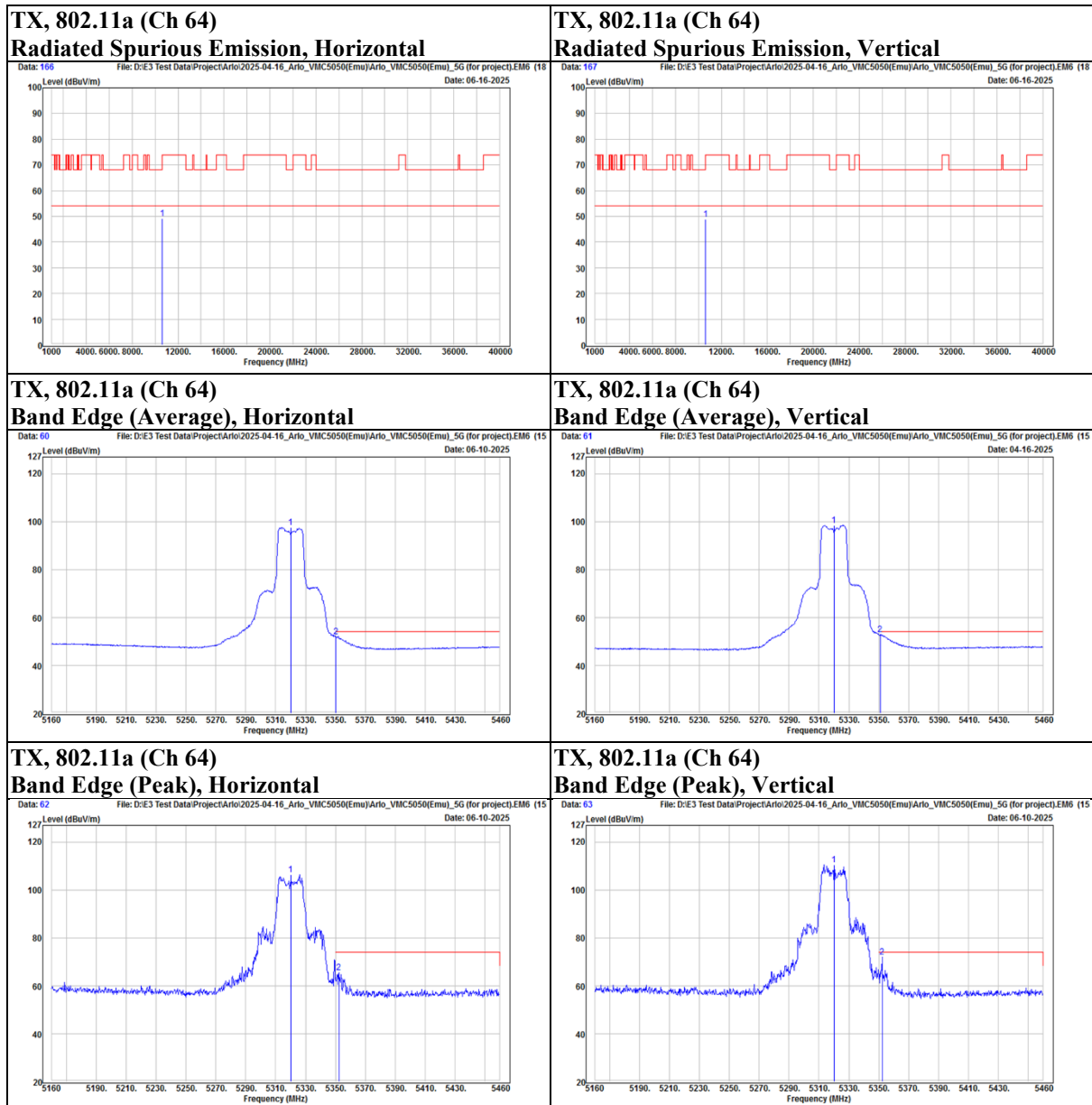
Underwriters Laboratories Taiwan Co., Ltd.

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

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



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		5459.15	42.5	19.95	62.45	74	-11.55	PK
		5459.85	30.18	19.95	50.13	54	-3.87	AVG
		5468.95	44.61	19.99	64.6	68.2	-3.6	PK
	@	5500	84.94	20.13	105.07	N/A	N/A	PK
	@	5500	73.21	20.13	93.34	N/A	N/A	AVG
	*	11000	30.71	18.57	49.28	74	-24.72	PK
Vertical		5456.35	41.28	19.93	61.21	74	-12.79	PK
		5458.1	30.72	19.94	50.66	54	-3.34	AVG
		5468.25	46.55	19.99	66.54	68.2	-1.66	PK
	@	5500	86.16	20.13	106.29	N/A	N/A	PK
	@	5500	77.77	20.13	97.9	N/A	N/A	AVG
	*	11000	30.03	18.57	48.6	74	-25.4	PK

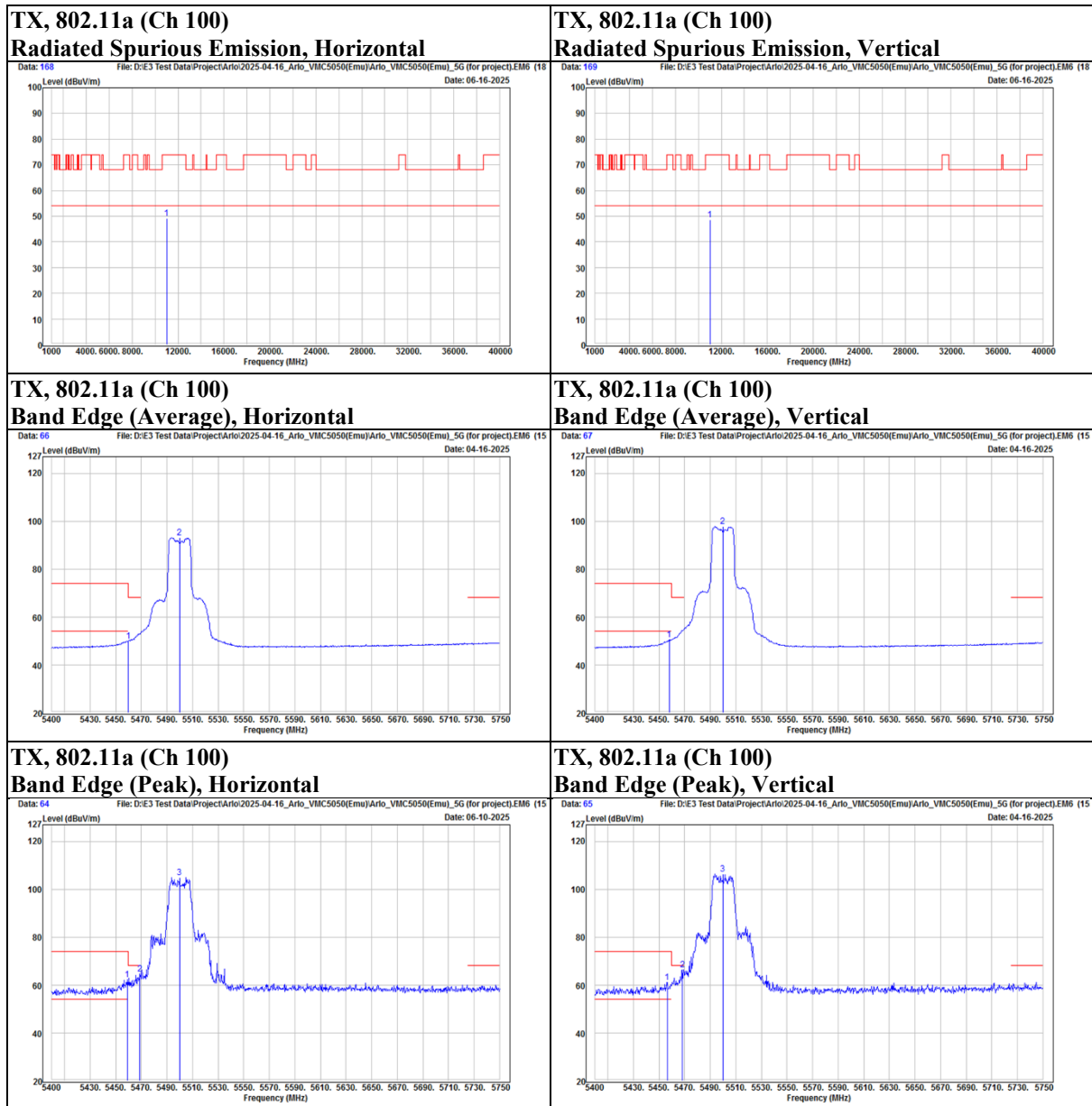
Underwriters Laboratories Taiwan Co., Ltd.

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



Mode	802.11a	Channel	116
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		5452.15	40.47	19.91	60.38	74	-13.62	PK
		5459.5	27.83	19.95	47.78	54	-6.22	AVG
		5468.95	38.72	19.99	58.71	68.2	-9.49	PK
	@	5580	84.37	20.08	104.45	N/A	N/A	PK
	@	5580	75.2	20.08	95.28	N/A	N/A	AVG
		5732.15	40.47	20.27	60.74	68.2	-7.46	PK
	*	11160	30.46	18.93	49.39	74	-24.61	PK
Vertical		5447.95	39.09	19.89	58.98	74	-15.02	PK
		5456.35	27.87	19.93	47.8	54	-6.2	AVG
		5464.4	38.93	19.97	58.9	68.2	-9.3	PK
	@	5580	86.12	20.08	106.2	N/A	N/A	PK
	@	5580	77.84	20.08	97.92	N/A	N/A	AVG
		5745.8	39.24	20.4	59.64	68.2	-8.56	PK
	*	11160	30.07	18.93	49	74	-25	PK

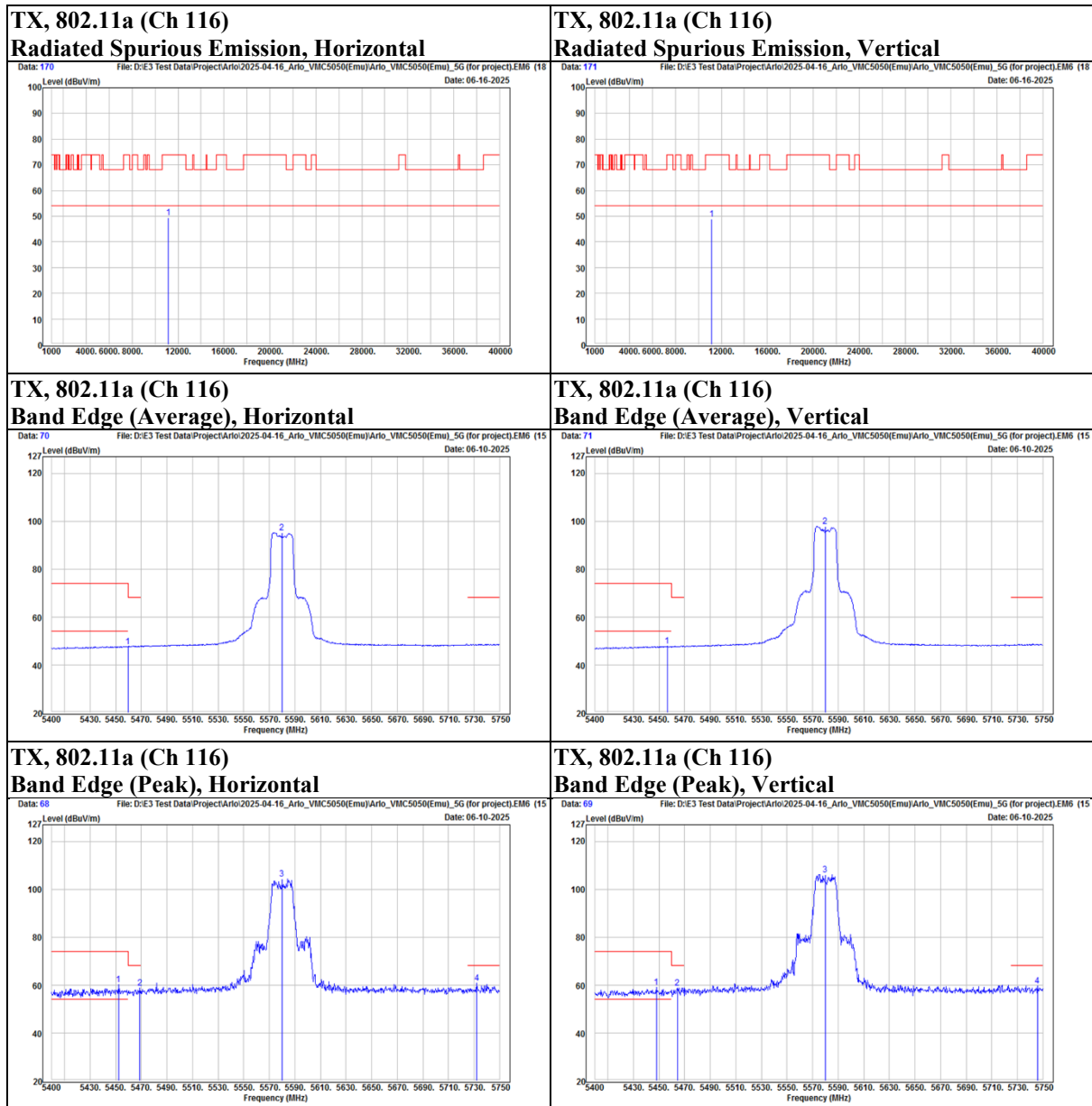
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Doc No: Form-ULID-004739 (DCS:17-EM-F0878) / 6.1



Mode	802.11a	Channel	140
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		5450.75	40.01	19.9	59.91	74	-14.09	PK
		5450.75	28.03	19.9	47.93	54	-6.07	AVG
		5466.85	39.92	19.98	59.9	68.2	-8.3	PK
	@	5700	78.53	19.96	98.49	N/A	N/A	PK
	@	5700	71.33	19.96	91.29	N/A	N/A	AVG
		5748.25	40.46	20.43	60.89	68.2	-7.31	PK
		11160	29.9	18.93	48.83	74	-25.17	PK
Vertical		5433.25	28.18	19.81	47.99	54	-6.01	AVG
		5447.6	40.43	19.89	60.32	74	-13.68	PK
		5461.6	38.97	19.95	58.92	68.2	-9.28	PK
	@	5700	83.62	19.96	103.58	N/A	N/A	PK
	@	5700	76.49	19.96	96.45	N/A	N/A	AVG
		5725	42.41	20.2	62.61	68.2	-5.59	PK
		11160	30.62	18.93	49.55	74	-24.45	PK

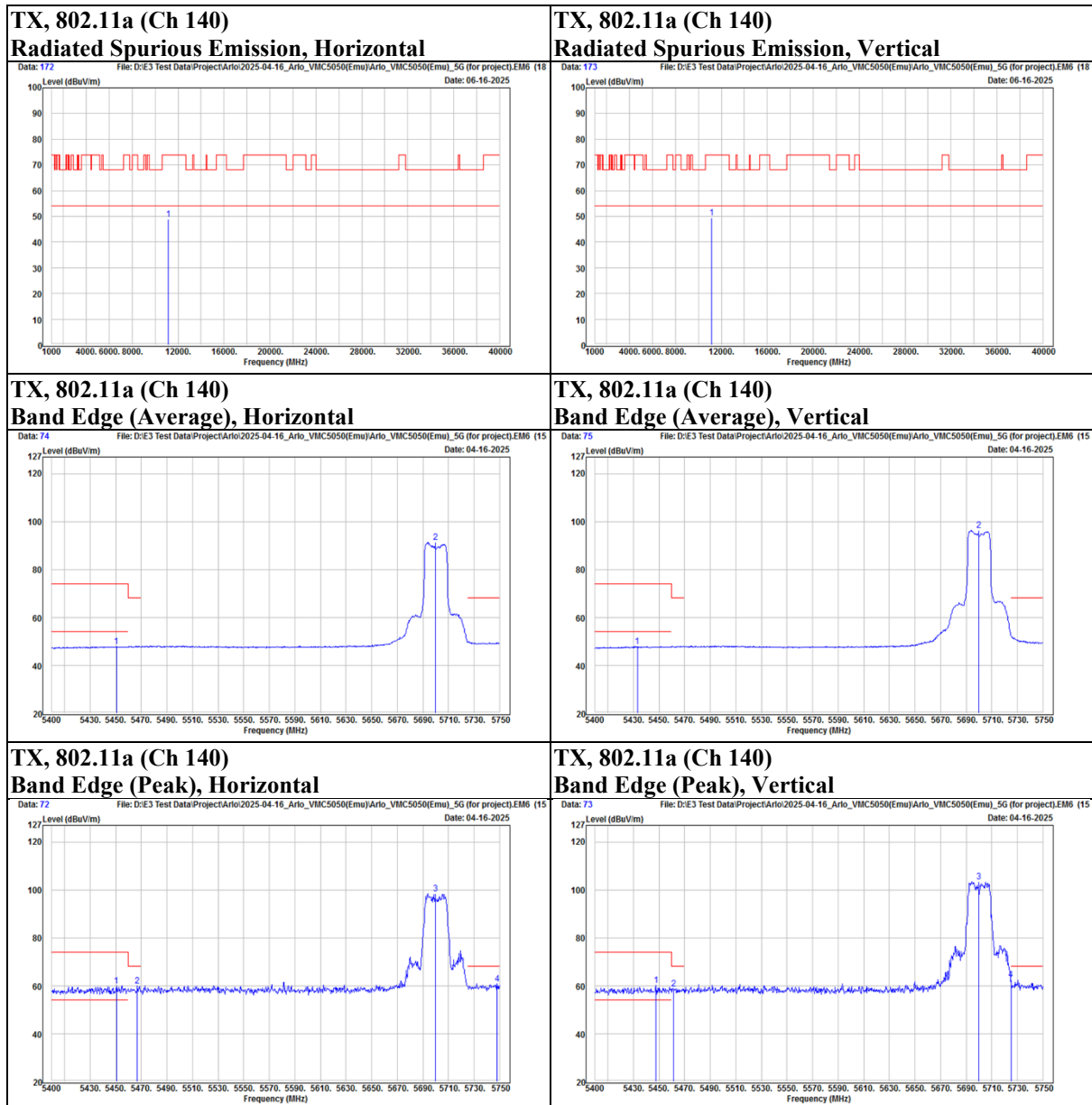
Underwriters Laboratories Taiwan Co., Ltd.

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

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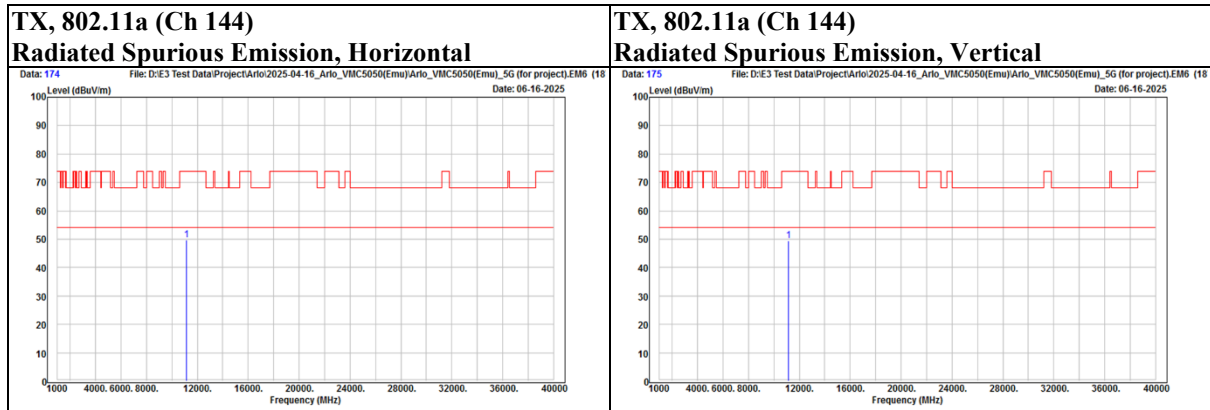
Facsimile (FAX) : +886-3-583-7948

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



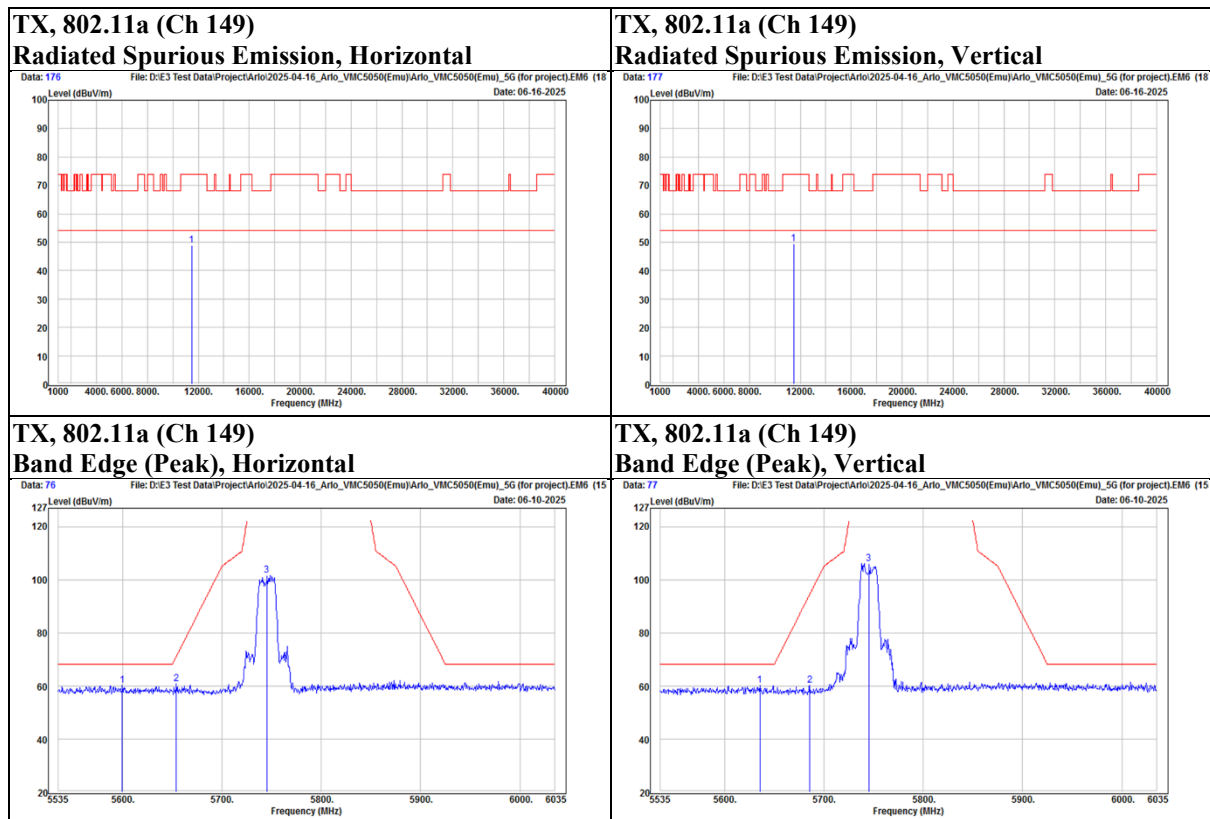
Mode	802.11a	Channel	144
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		11160	30.87	18.93	49.8	74	-24.2	PK
Vertical		11160	30.42	18.93	49.35	74	-24.65	PK



Mode	802.11a	Channel	149
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		5599.5	40.02	20.12	60.14	68.2	-8.06	PK
		5654	40.72	20.03	60.75	71.17	-10.42	PK
	@	5745	81.25	20.39	101.64	N/A	N/A	PK
	*	11490	29.34	19.52	48.86	74	-25.14	PK
Vertical		5635.5	40.21	20.06	60.27	68.2	-7.93	PK
		5685.5	40.19	19.99	60.18	94.5	-34.32	PK
	@	5745	85.85	20.39	106.24	N/A	N/A	PK
	*	11490	29.81	19.52	49.33	74	-24.67	PK

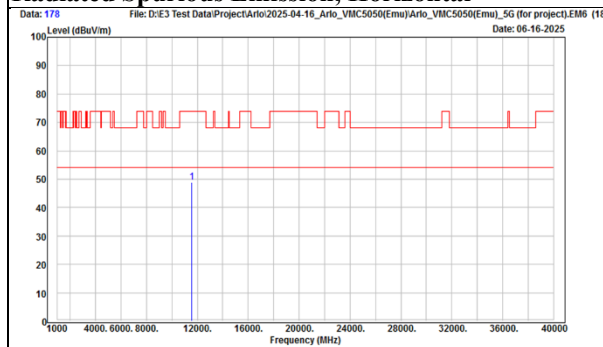


Mode	802.11a	Channel	157
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal		5640	39.67	20.05	59.72	68.2	-8.48	PK
		5650.5	40.63	20.04	60.67	68.57	-7.9	PK
	@	5785	80.71	20.83	101.54	N/A	N/A	PK
		5909.5	40.11	21.26	61.37	79.64	-18.27	PK
		5951.5	39.96	21.21	61.17	68.2	-7.03	PK
	*	11570	29.81	19.03	48.84	74	-25.16	PK
Vertical		5552.5	40.58	20.04	60.62	68.2	-7.58	PK
		5668.5	39.21	20	59.21	81.93	-22.72	PK
	@	5785	84.79	20.83	105.62	N/A	N/A	PK
		5875	40.62	21.26	61.88	105.2	-43.32	PK
		5944.5	39.8	21.21	61.01	68.2	-7.19	PK
	*	11570	29.64	19.03	48.67	74	-25.33	PK

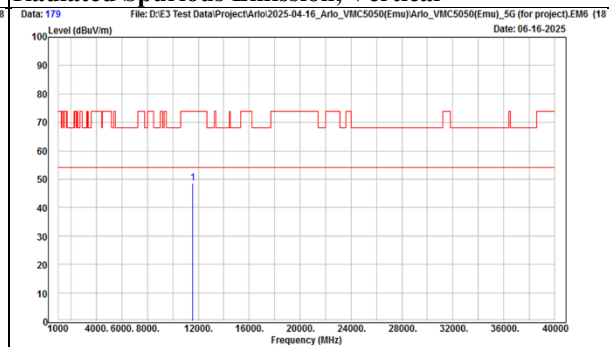
TX, 802.11a (Ch 157)

Radiated Spurious Emission, Horizontal



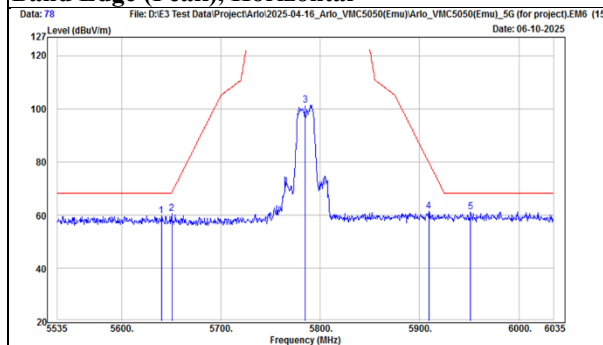
TX, 802.11a (Ch 157)

Radiated Spurious Emission, Vertical



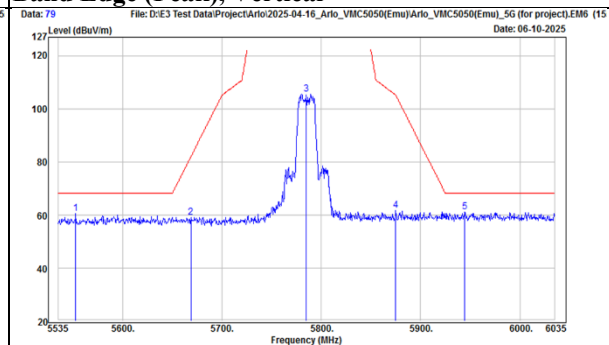
TX, 802.11a (Ch 157)

Band Edge (Peak), Horizontal



TX, 802.11a (Ch 157)

Band Edge (Peak), Vertical



Mode	802.11a	Channel	165
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Polarization	Notation	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Horizontal	@	5825	81.19	21.12	102.31	N/A	N/A	PK
		5904	40.28	21.26	61.54	83.7	-22.16	PK
		5937.5	40.95	21.22	62.17	68.2	-6.03	PK
	*	11650	29.77	18.75	48.52	74	-25.48	PK
Vertical	@	5825	84.11	21.12	105.23	N/A	N/A	PK
		5902	39.79	21.27	61.06	85.18	-24.12	PK
		6015.5	40.13	21.39	61.52	68.2	-6.68	PK
	*	11650	30.46	18.75	49.21	74	-24.79	PK

