



TEST REPORT

Eurofins KCTL Co.,Ltd. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-70-4904-0113 FAX: 82-505-299-8311 www.kctl.co.kr	Report No.: KR25-SRF0231 Page(1) of (50)	KCTL
---	---	---

1. Client

- Name : Crestron Electronics Inc.
- Address : 15 Volvo Drive, Rockleigh, NJ 07647, United States
- Date of Receipt : 2025-10-01

2. Use of Report : Certification

3. Name of Product / Model : Cevo Mini Handheld Touch Screen Remote / M202524001

4. Manufacturer / Country of Origin : Crestron Electronics Inc. / USA, Mexico

5. FCC ID : EROHRCVMINI

6. Date of Test : 2025-10-22 to 2025-12-22

7. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing
 (Address: 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)

8. Test method used : FCC Part 15 Subpart E, 15.407

9. Test Result : Refer to the test result in the test report

Affirmation	Tested by Name : Minki Kim (Signature)	Technical Manager Name : Euijung Kim (Signature)
-------------	---	---

2025-12-23

Eurofins KCTL Co.,Ltd.

As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by Eurofins KCTL Co.,Ltd.

REPORT REVISION HISTORY

Date	Revision	Page No
2025-12-23	Originally issued	-

This report shall not be reproduced except in full, without the written approval of Eurofins KCTL Co.,Ltd. This document may be altered or revised by Eurofins KCTL Co.,Ltd. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by Eurofins KCTL Co.,Ltd. will constitute fraud and shall nullify the document. This test report is a general report that does not use the KOLAS accreditation mark and is not related to KS Q ISO/IEC 17025 and KOLAS accreditation.

General remarks for test reports

Statement concerning the uncertainty of the measurement systems used for the tests

(may be required by the product standard or client)

☐ Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:

Procedure number, issue date and title:

Calculations leading to the reported values are on file with the testing laboratory that conducted the testing.

☒ Statement not required by the standard or client used for type testing

CONTENTS

1.	General information	4
2.	Device information	4
2.1.	Information about derivative model.....	5
2.2.	Accessory information	5
2.3.	Frequency/channel operations.....	5
2.4.	RF power setting in TEST SW	5
2.5.	Duty Cycle Factor	6
3.	Antenna requirement	6
4.	Summary of tests.....	7
5.	Measurement uncertainty	8
6.	Measurement results explanation example	9
7.	Test results	10
7.1.	Maximum conducted output power	10
7.2.	Maximum Power Spectral Density	12
7.3.	26 dB Bandwidth & 99% Bandwidth.....	15
7.4.	DFS (Dynamic Frequency Selection).....	20
7.5.	Frequency stability	28
7.6.	Spurious Emission, Band Edge and Restricted bands.....	32
7.7.	AC Conducted emission	48
8.	Measurement equipment	50

2.1. Information about derivative model

The difference between basic model and derivative models is:

The only difference is the model name; all models use the same radio hardware, including circuits and electrical components, and the same software.

Basic model	Variant model	Difference
M202524001	HR-CV-MINI	Marketing purpose

2.2. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power Source
Li-ion polymer battery	Shenzhen Honcell Energy CO., LTD	38.040 – HCP502946N	-	Normal voltage : 3.7 V Capacity : 770 mAh Charging voltage : 4.2 V Power : 2.85 Wh

2.3. Frequency/channel operations

This device contains the following capabilities:

WLAN 5 GHz_802.11a

UNII 1		UNII 2A		UNII 2C	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
36	5 180	52	5 260	100	5 500
40	5 200	56	5 280	116	5 580
48	5 240	64	5 320	140	5 700

Table 2.3-1. 802.11a mode

Notes:

- The device supports DFS bands between UNII 2A and UNII 2C and operates as a slave device controlled by master

2.4. RF power setting in TEST SW

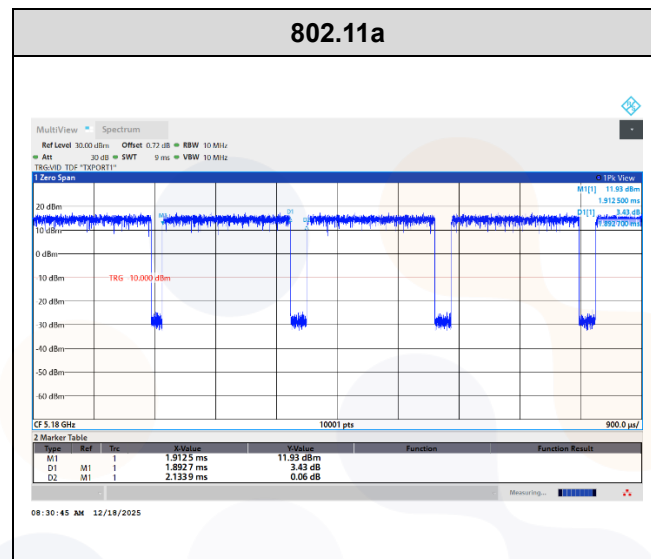
Test Program	Test Mode	Frequency [MHz]	Power Level Setting
Radiotool v1.0.3.19	802.11a	5 180	Default
		5 200	
		5 240	
		5 260	
		5 280	
		5 320	
		5 500	
		5 580	
		5 700	

2.5. Duty Cycle Factor

Test mode	Period (ms)	T _{On} time (ms)	Duty cycle		Duty cycle factor (dB)
			(Linear)	(%)	
802.11a	2.133 9	1.892 7	0.887 0	88.70	0.52

Notes:

1. Duty cycle (Linear) = T_{On} time / Period
2. DCF(Duty cycle factor) = 10log(1/duty cycle)
3. DCF is not compensated to average result if the duty cycle is more than 98%



3. Antenna requirement

Requirement of FCC part section 15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

- The transmitter has permanently attached Metal frame Antenna (External antenna) on board.
- The E.U.T Complies with the requirement of §15.203, §15.407.

4. Summary of tests

FCC Part section(s)	Parameter	Test Condition	Test results
15.407(a)	Maximum conducted output power	Conducted	Pass
15.407(a)	Maximum power spectral density		Pass
15.407(a)	26 dB Channel Bandwidth		Pass
15.407(e)	6 dB Channel Bandwidth		N/T ¹⁾
-	Occupied Bandwidth		Pass
15.407(g)	Frequency Stability		Pass
15.207(a)	AC Conducted Emissions		Pass
15.407(h)	DFS -Channel closing transmission time -Channel move time -Non occupied period		Pass
15.407(b), 15.205(a), 15.209(a)	Spurious emission	Radiated	Pass
	Band-edge, restricted band		Pass

Notes: (N/T: Not Tested, N/A: Not Applicable)

1. This device has not been tested because it does not support UNII-3 bands.
2. All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
3. According to exploratory test no any obvious emission were detected from 9 kHz to 30 MHz. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30 m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.
4. EUT was investigated in three orthogonal orientations X, Y and Z. it was determined that X orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in X orientation.
5. The test procedure(s) in this report were performed in accordance as following.
 - ANSI C63.10-2020
 - KDB 789033 D02 v02r01
 - KDB 905462 D02 UNII DFS compliance procedure new rules.
 - KDB 905462 D03 UNII client without radar detection new rules.
6. Based on the baseline scan, the worst-case data rates were:
 802.11a mode : 6 Mbps

5. Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2020.

All measurement uncertainty values are shown with a coverage factor of $k=2$ to indicated a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty ($\pm$)	
Conducted RF Power	0.9 dB	
Conducted spurious emissions	2.0 dB	
Radiated spurious emissions	Below 30 MHz	2.3 dB
	30 MHz to 1 000 MHz	2.6 dB
	1 000 MHz to 18 000 MHz	4.8 dB
	Above 18 000 MHz	4.8 dB
Conducted emissions	150 kHz to 30 MHz	2.9 dB

6. Measurement results explanation example

The offset level is set in the spectrum analyzer to compensate the RF cable loss factor between EUT conducted output port and spectrum analyzer.

With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Frequency(MHz)	Factor(dB)	Frequency(MHz)	Factor(dB)
30	10.07	9 000	13.00
50	10.31	10 000	12.93
100	10.42	11 000	12.86
200	10.66	12 000	12.76
300	10.68	13 000	12.70
400	10.66	14 000	12.88
500	10.76	15 000	12.82
600	10.78	16 000	12.98
700	11.04	17 000	13.01
800	11.23	18 000	13.33
900	11.22	19 000	13.80
1 000	11.42	20 000	13.60
2 000	12.98	21 000	13.65
3 000	13.24	22 000	13.31
4 000	13.70	23 000	13.29
5 000	12.80	24 000	13.32
6 000	12.40	25 000	13.94
7 000	13.51	26 000	13.76
8 000	13.20	26 500	13.71

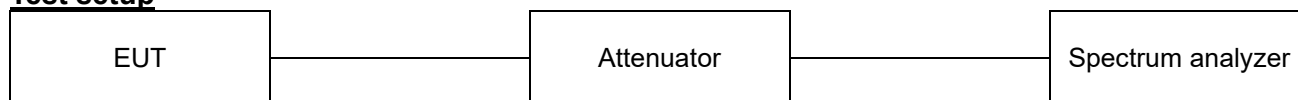
Notes:

Offset(dB) = RF cable loss(dB) + Attenuator(dB)

7. Test results

7.1. Maximum conducted output power

Test setup



Limit

According to §15.407(a),

Band	EUT category		Conducted output power limit
UNII-1		Outdoor access point	1 W (30 dBm)
		Indoor access point	
		Fixed point-to-point access point	
	√	Client device	250 mW (23.98 dBm)
UNII-2A	√		250 mW or 11 dBm + 10logB ¹⁾
UNII-2C	√		250 mW or 11 dBm + 10logB ¹⁾
UNII-3			1 W (30 dBm)

Note:

- 1) Conducted output power limit B is the 26 dB emission bandwidth.
- 2) Maximum e.i.r.p. limit B is the 99% emission bandwidth.

Test procedure

ANSI C63.10-2020-Section 12.4.2.4
 KDB 789033 D02 v02r01 - Section E.2.d)

Test settings

Used test method is Section E.2.d)

◆ KDB 789033 D02 v02r01

Section E.2.d)

Method SA-2 (trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction):

- (i) Measure the duty cycle, x, of the transmitter output signal as described in II.B..
- (ii) Set span to encompass the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
- (iii) Set RBW = 1 MHz
- (iv) Set RBW $\geq$ 3 MHz
- (v) Number of points in sweep $\geq 2 \times \text{span} / \text{RBW}$. (This ensures that bin-to-bin spacing is $\leq \text{RBW} / 2$, so that narrowband signals are not lost between frequency bins.)
- (vi) Sweep time = auto.
- (vii) Detector = power averaging (rms), if available. Otherwise use sample detector mode.
- (viii) Do not use sweep triggering. Allow the sweep to “free run.”
- (ix) Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed to ensure that the average accurately represents the true average over the on and off periods of the transmitter.
- (x) Compute power by integrating the spectrum across the 99% OBW of the signal using the instrument’s band-power measurement function with band limits set equal to the EBW or OBW band-edges. If the instrument does not have a band-power function, then sum the spectrum levels (in power units) at 1 MHz intervals extending across the 99% OBW of the spectrum.
- (xi) Add $10 \log(1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add $10 \log(1/0.25) = 6$ dB if the duty cycle is 25%.

Test results

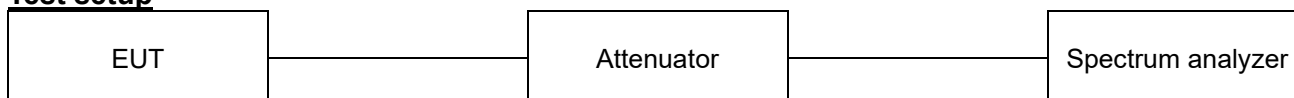
Test mode	Band	Frequency (MHz)	Measured output power			Limit (dBm)
			Reading (dBm)	DCF (dB)	Result (dBm)	
802.11a	UNII 1	5 180	11.23	0.52	11.75	23.98
		5 200	13.78		14.30	
		5 240	13.65		14.17	
	UNII 2A	5 260	13.63		14.15	23.98
		5 280	13.40		13.92	
		5 320	12.79		13.31	
	UNII 2C	5 500	12.23		12.75	23.98
		5 580	14.35		14.87	
		5 700	9.31		9.83	

Note:

1. Result (dBm) = Reading (dBm) + D.C.F (dB)

7.2. Maximum Power Spectral Density

Test setup



Limit

According to §15.407(a),

Band	EUT category		Limit
UNII-1		Outdoor access point	17dBm/MHz
		Indoor access point	
		Fixed point-to-point access point	
	√	Client device	11 dBm /MHz
UNII-2A		√	11 dBm /MHz
UNII-2C		√	11 dBm /MHz
UNII-3			30 dBm /500 kHz

Notes:

If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power And the peak power spectral density shall be reduced by the amount in dB that the directional gain if the antenna exceed 6 dBi

Test procedure

ANSI C63.10-2020 Section 12.6, 12.4.2.4
 KDB 789033 D02 v02r01 - Section E and F

Test settings (12.6)

Notwithstanding that some regulatory requirements refer to peak power spectral density (PPSD), in some cases the intent is to measure the maximum value of the time average of the power spectral density during a period of continuous transmission. The procedure for this method is as follows:

- Create an average power spectrum for the EUT operating mode being tested by following the instructions in 12.4.2 for measuring maximum conducted output power using a spectrum analyzer or EMI receiver; that is, select the appropriate test method (SA-1, SA-2, SA-3, or their respective alternatives) and apply it up to, but not including, the step labeled, "Compute power...." (This procedure is required even if the maximum conducted output power measurement was performed using the power meter method PM.)
- Use the peak search function on the instrument to find the peak of the spectrum.
- Make the following corrections to the peak value of the spectrum, if applicable:
 - If method SA-2 or SA-2A was used, then add $[10 \log (1 / D)]$, where D is the duty cycle, to the peak of the spectrum.
 - If method SA-3A was used and the linear mode was used in step h) of 12.4.2.7, add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
- The result is the PPSD.
- The procedure in item a) through item c) requires the use of 1 MHz resolution bandwidth to satisfy the 1 MHz measurement bandwidth specified by some regulatory authorities.⁸⁵ This requirement also permits use of resolution bandwidths less than 1 MHz "provided that the measured power is integrated to show the total power over the measurement bandwidth" (i.e., 1 MHz). If measurements are performed using a reduced resolution bandwidth and integrated over 1 MHz bandwidth, the following adjustments to the procedures apply:
 - Set $RBW \geq 1 / T$, where T is defined in 12.2 a).
 - Set $VBW \geq [3 \times RBW]$.

- 3) Care shall be taken such that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Test settings (12.4.2.4)

Method SA-2 uses trace averaging across ON and OFF times of the EUT transmissions, followed by duty cycle correction. The procedure for this method is as follows:

- Measure the duty cycle D of the transmitter output signal as described in 12.2.
- Set span to encompass the entire 99% OBW of the signal.
- Set RBW = 1 MHz.
- Set VBW ≥ 3 MHz.
- Number of points in sweep ≥ $[2 \times \text{span} / \text{RBW}]$. (This gives bin-to-bin spacing ≤ RBW / 2, so that narrowband signals are not lost between frequency bins.)
- Sweep time = auto.
- Detector = Power averaging (rms), if available. Otherwise, use sample detector mode.
- Do not use sweep triggering. Allow the sweep to “free run.”
- Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed such that the average accurately represents the true average over the ON and OFF periods of the transmitter.
- Compute power by integrating the spectrum across the 99% OBW of the signal using the instrument's band-power measurement function with band limits set equal to the EBW or OBW band-edges. If the instrument does not have a band-power function, then sum the spectrum levels (in power units) at 1 MHz intervals extending across the 99% OBW of the spectrum.
- Add $[10 \log (1 / D)]$, where D is the duty cycle, to the measured power to compute the average power during the actual transmission times (because the measurement represents an average over both the ON and OFF times of the transmission). For example, add $[10 \log (1 / 0.25)] = 6 \text{ dB}$ if the duty cycle is 25%.

Test results

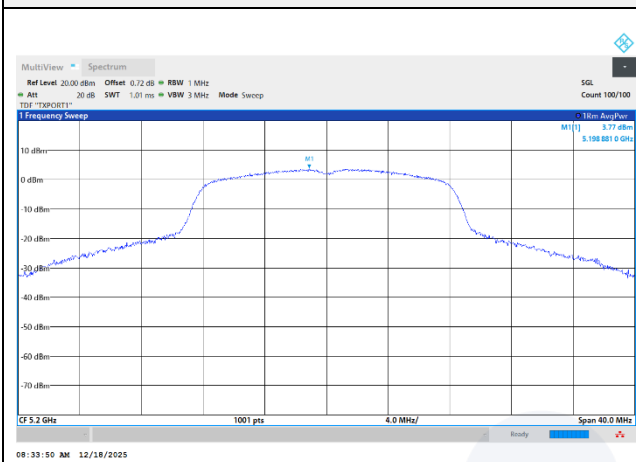
Test mode	Band	Frequency (MHz)	Measured PSD (dBm/MHz)	DCF (dB)	Maximum PSD (dB m/MHz)	Limit (dBm/MHz)
802.11a	UNII 1	5 180	1.21	0.52	1.73	11.00
		5 200	3.77		4.29	
		5 240	3.76		4.28	
	UNII 2A	5 260	3.59		4.11	11.00
		5 280	3.37		3.89	
		5 320	2.59		3.11	
	UNII 2C	5 500	2.32		2.84	11.00
		5 580	4.27		4.79	
		5 700	-0.79		-0.27	

Notes:

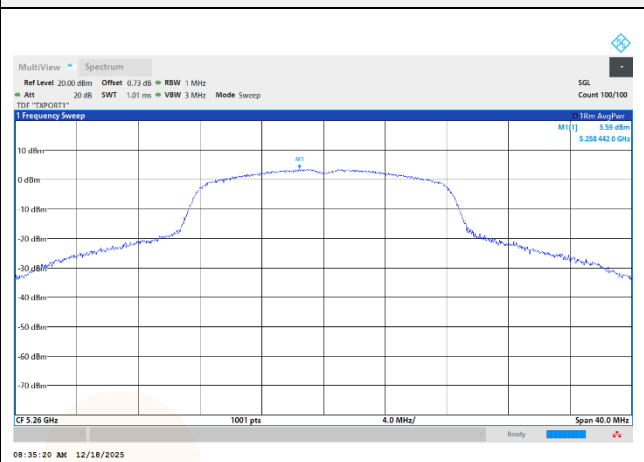
- Maximum PSD (dB m/MHz) = Reading (dB m/MHz) + D.C.F (dB)

In order to simplify the report, the attached plots show the worst case per band.

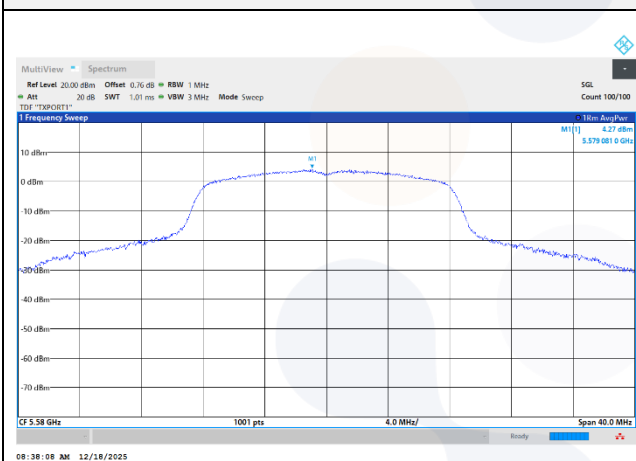
UNII 1 / 802.11a / Mid ch.



UNII 2A / 802.11a / Low ch.



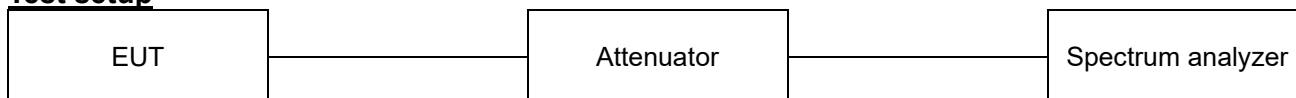
UNII 2C / 802.11a / Mid ch.



Blank

7.3. 26 dB Bandwidth & 99% Bandwidth

Test setup



Limit

N/A

Test procedure

ANSI C63.10-2020 Section 12.5.2, 6.9.3

KDB 789033 D02 v02r01 - Section C.1 (26dB bandwidth), Section D (99% bandwidth)

Test settings

Emission bandwidth for all other bands (or 26 dB Bandwidth)

- Set RBW = Shall be in the range of 1% to 5% 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 peak of the emission.
Compare this with the RBW setting of the instrument. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is in the range of 1% to 5%.

Occupied bandwidth (or 99% Occupied Bandwidth)

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

The following procedure shall be used for measuring 99% power bandwidth:

- The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
- The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be at least three times the RBW, unless otherwise specified by the applicable requirement.
- Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (OBW/RBW)]$ below the reference level. Specific guidance is given in 4.1.6.2.
- Step a) through step c) might require iteration to adjust within the specified range.
- 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) and report the measured bandwidth.
- If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. 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% power bandwidth is the difference between these two frequencies.
- The occupied bandwidth shall be reported by providing spectral plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

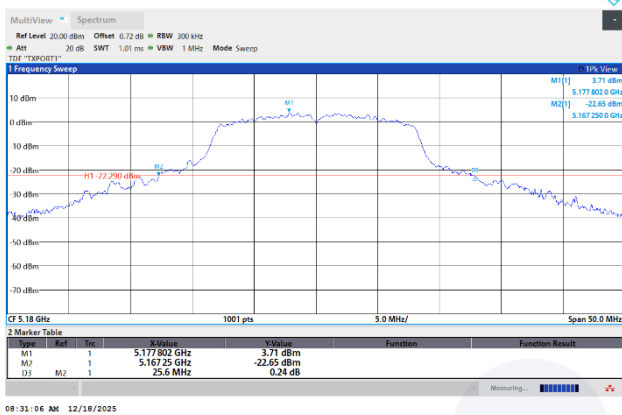
Test results

Test mode	Band	Frequency(MHz)	26 dB bandwidth (MHz)	99% Bandwidth (MHz)
802.11a	UNII 1	5 180	25.60	16.82
		5 200	31.55	17.84
		5 240	31.25	17.78

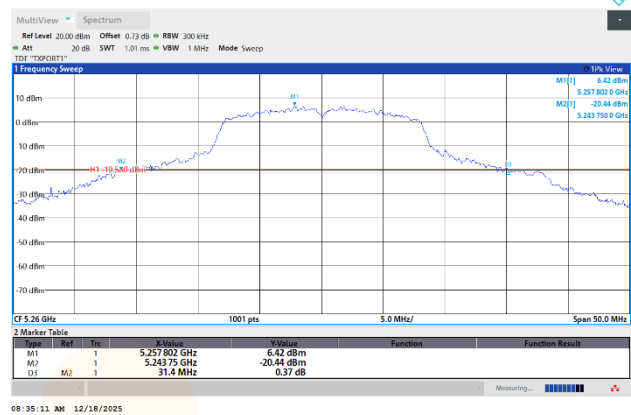
Test mode	Band	Frequency(MHz)	26 dB bandwidth (MHz)
802.11a	UNII 2A	5 260	31.40
		5 280	31.15
		5 320	25.90
	UNII 2C	5 500	26.00
		5 580	34.55
		5 700	23.60

26 dB Bandwidth

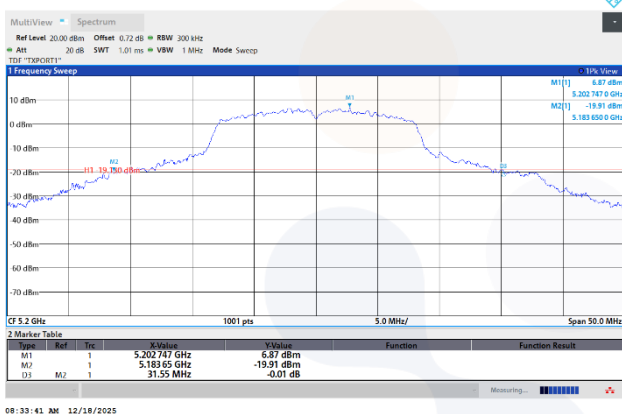
UNII 1 / 802.11a / Low ch.



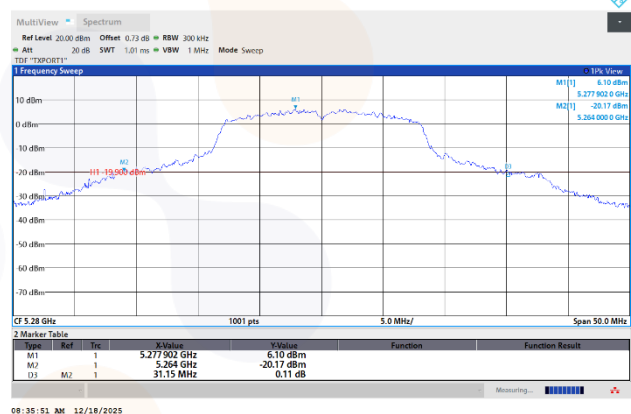
UNII 2A / 802.11a / Low ch.



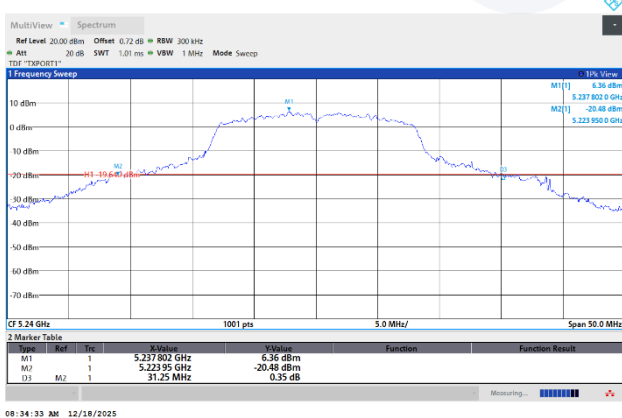
UNII 1 / 802.11a / Mid ch.



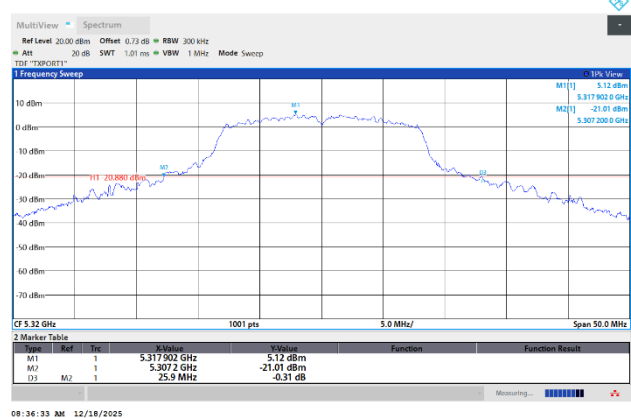
UNII 2A / 802.11a / Mid ch.



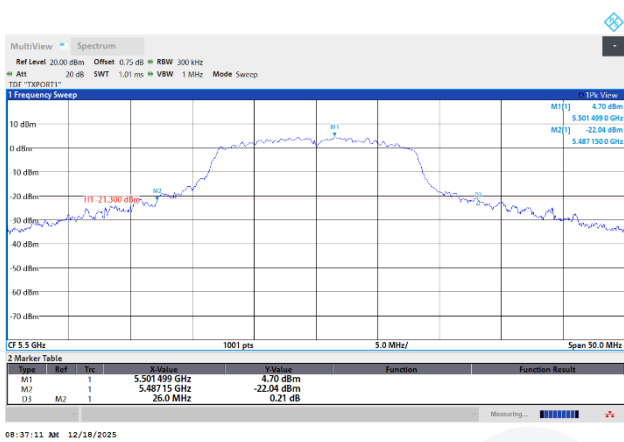
UNII 1 / 802.11a / High ch.



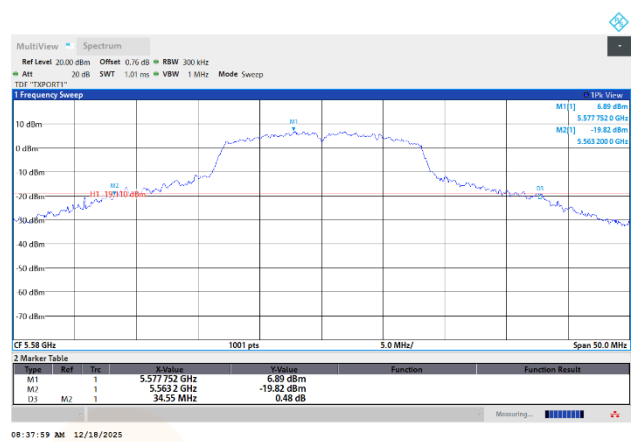
UNII 2A / 802.11a / High ch.



UNII 2C / 802.11a / Low ch.



UNII 2C / 802.11a / Mid ch.



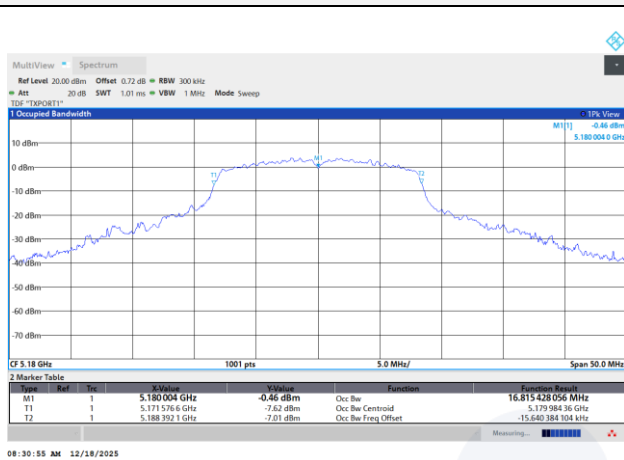
UNII 2C / 802.11a / High ch.



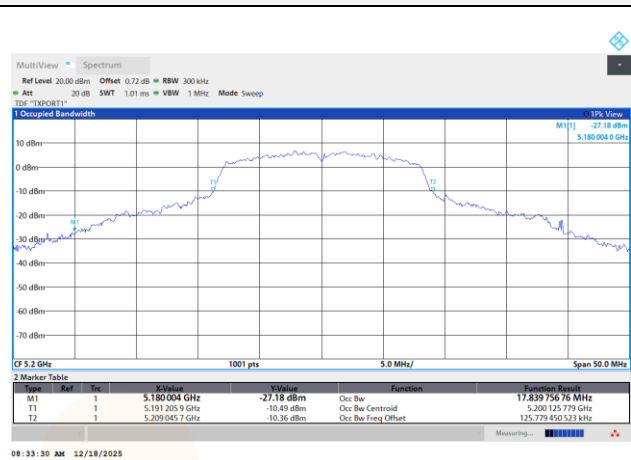
Blank

99% Bandwidth

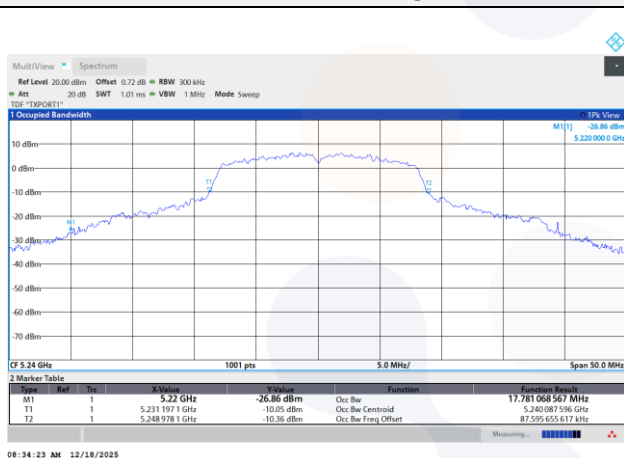
UNII-1 / 802.11a / Low ch.



UNII-1 / 802.11a / Mid ch.



UNII-1 / 802.11a / High ch.



Blank

7.4. DFS (Dynamic Frequency Selection)

Test description

- Applicability of DFS requirements prior to use of a channel

Requirement	Operational Mode		
	Master	<u>Client (Without radar detection)</u>	<u>Client (With radar detection)</u>
Non-Occupancy Period	Yes	<u>Not required</u>	Yes
DFS Detection Threshold	Yes	<u>Not required</u>	Yes
Channel Availability Check Time	Yes	<u>Not required</u>	Not required
U-NII Detection Bandwidth	Yes	<u>Not required</u>	Yes

- Applicability of DFS requirements during normal operation

Requirement	Operational Mode	
	Master Device or Client with Radar Detection	<u>Client Without Radar Detection</u>
DFS Detection Threshold	Yes	Not required
Channel Closing Transmission Time	Yes	<u>Yes</u>
Channel Move Time	Yes	<u>Yes</u>
Bandwidth	Yes	Not required

Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar Detection	<u>Client Without Radar Detection</u>
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	<u>Test using the widest BW mode available for the link</u>
All other tests	Any single BW mode	Not required

Note: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.

- Requirements of client devices

- a) A Client Device will not transmit before having received appropriate control signals from a Master Device.
- b) A Client Device will stop all its transmissions whenever instructed by a Master Device to which it is associated and will meet the Channel Move Time and Channel Closing Transmission Time requirements. The Client Device will not resume any transmissions until it has again received control signals from a Master Device.
- c) If a Client Device is performing In-Service Monitoring and detects a Radar Waveform above the DFS Detection Threshold, it will inform the Master Device. This is equivalent to the Master Device detecting the Radar Waveform and d) through f) of section 5.1.1 apply.
- d) Irrespective of Client Device or Master Device detection the Channel Move Time and Channel Closing Transmission Time requirements remain the same.
- e) The client test frequency must be monitored to ensure no transmission of any type has occurred for 30 minutes. Note: If the client moves with the master, the device is considered compliant if nothing appears in the client non-occupancy

- DFS Response requirement values

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
Note 1: Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst. Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.	

- Interference Threshold values, Master or Client incorporating In-Service Monitoring

Maximum Transmit Power	Value (see note)
≥ 200 milliwatt	-64 dBm
< 200 milliwatt $\text{power spectral density} < 10 \text{ dBm/MHz}$	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna

Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.

Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.

- Radar test waveforms

Type	Pulse Width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
<u>0</u>	<u>1</u>	<u>1428</u>	<u>18</u>	<u>See Note 1</u>	<u>See Note 1</u>
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a	$\text{Roundup}\left\{\left(\frac{1}{360}\right) \cdot \left(\frac{19 \cdot 10^6}{PRI_{\mu\text{sec}}}\right)\right\}$	60%	30
		Test B: 15 unique PRI values randomly selected within the range of 518-3066 μsec, with a minimum increment of 1 μsec, excluding PRI values selected in Test A			
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.

Note 2: This report was applied Short Pulse Radar Type 0.

*Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (μs)	Chirp Width (MHz)	PRI (μs)	Number of Pulses per Burst	Number of Bursts	Minimum percentage of Successful Detection	Minimum Number of Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

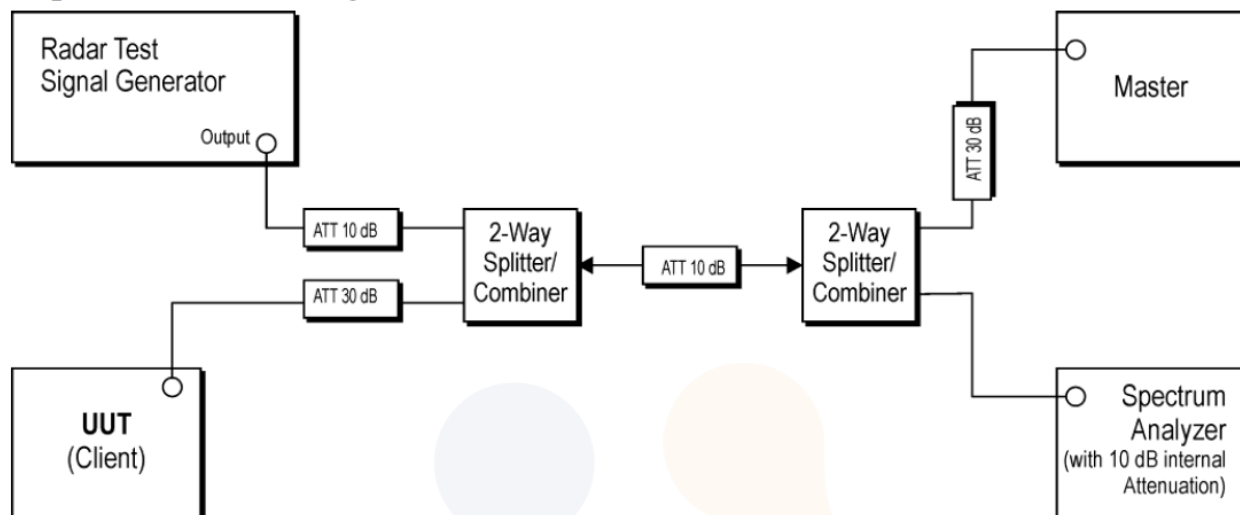
*Long Pulse Radar Test Waveform

Radar Waveform	Pulse Width (μsec)	PRI (μsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (μs)	Minimum Percentage of Successful Detection	Minimum Trials
6	1	333	9	0.333	300	70%	30

*Frequency Hopping Radar Test Waveform

Test setup

- Setup for Client with injection at the Master



- Spectrum analyzer setting parameter

This setting parameter is shown below and it according to the 905462 D02 UNII DFS Compliance Procedures New Rules.

- 1) RBW/VBW ≥ 3 MHz
- 2) Detector = peak
- 3) Span = zero span

- Conducted test procedure

- 1) One frequency will be chosen from the Operating Channels of the UUT within the 5 250-5 350 MHz or 5 470-5 725 MHz bands.
- 2) The Client Device (EUT) is set up the above diagram and communications between the Master device and the Client is established.
- 3) Stream the channel loading test file from the Master Device to the Client Device on the test Channel for the entire period of the test.
- 4) An additional 1 dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.
- 5) Observe the transmissions of the UUT at the end of the Burst on the Operating Channel for duration greater than 12 seconds for Radar Type 0 to ensure detection occurs.
- 6) After the initial radar burst the channel is monitored for 30 minutes to ensure no transmissions or beacons occur. A second monitoring setup is used to verify that the Master and Client have both moved to different channels.

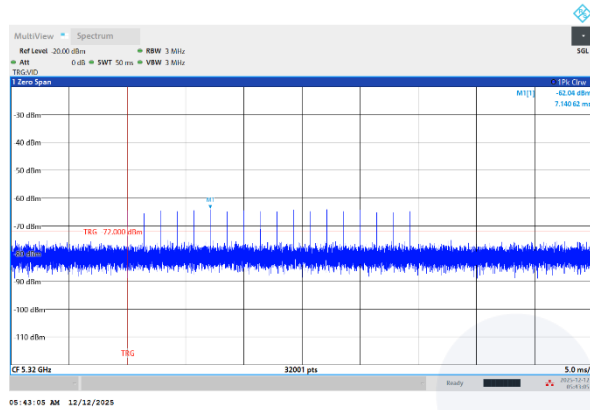
- Master device information

Equipment Name	Manufacturer	Model No.	Serial No.	FCC ID
Access Point	ASUSTeK Computer Inc	RT-BE96U	R9IG6G200115M3F	MSQ-RTBE6G00

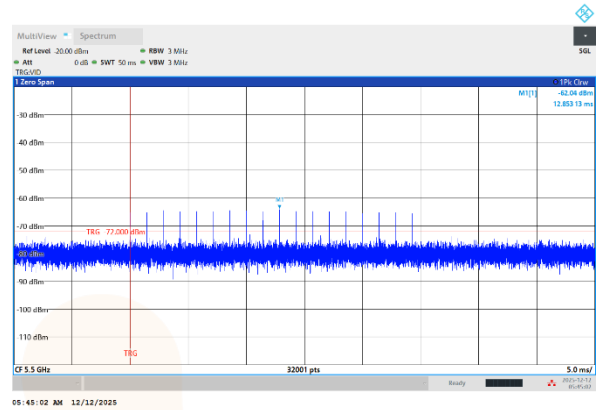
Test result

Plot of radar waveform

5 320 MHz

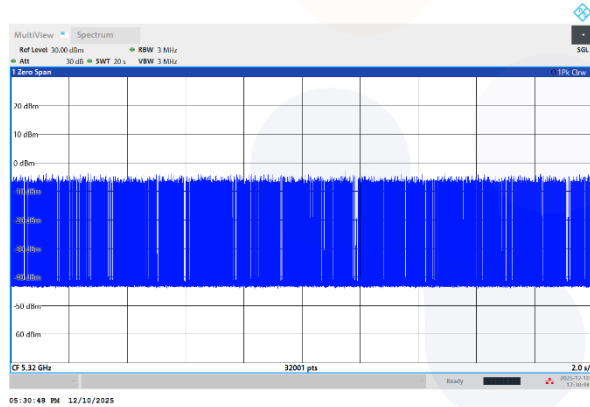


5 500 MHz

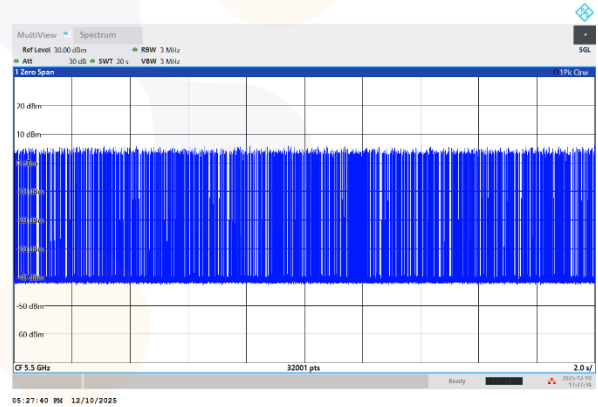


Plot of LAN traffic

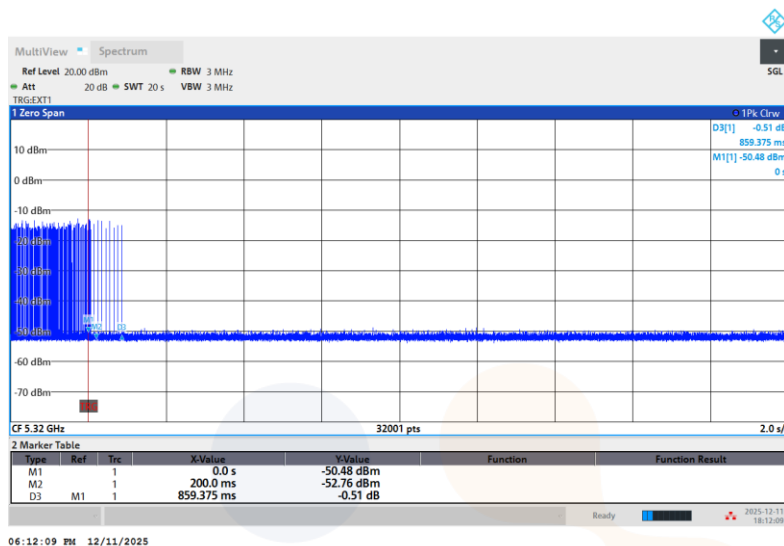
5 320 MHz



5 500 MHz

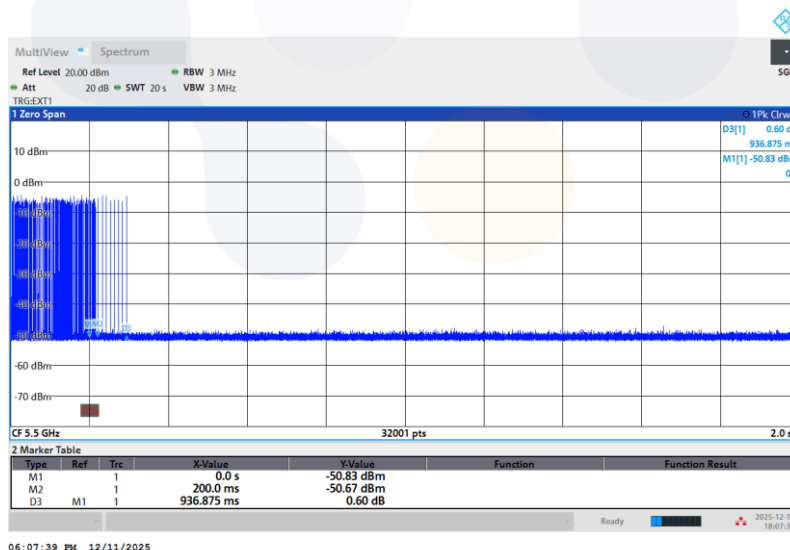


Plot of channel move time and aggregate time



Channel move time = 0.859 375 s
Closing time = 0.000 625 s x 36 = 0.022 500 s
(Closing time : Burst unit time(20 s / 32 001 points) * Number of burst(between 2 markers))

UNII-2A: 802.11a, 5 320 MHz

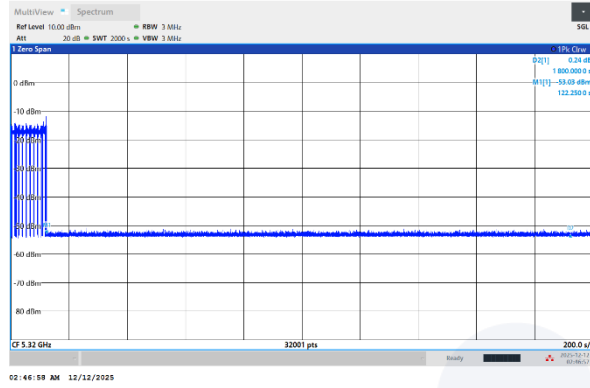


Channel move time = 0.936 875 s
Closing time = 0.000 625 s x 36 = 0.022 500 s
(Closing time : Burst unit time(20 s / 32 001 points) * Number of burst(between 2 markers))

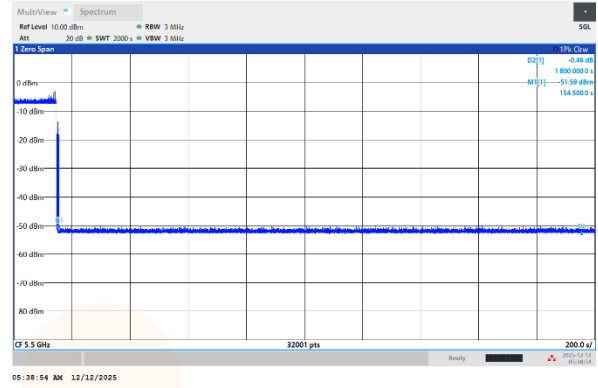
UNII-2C: 802.11a, 5 500 MHz

Plot of Non-occupancy period

5 320 MHz

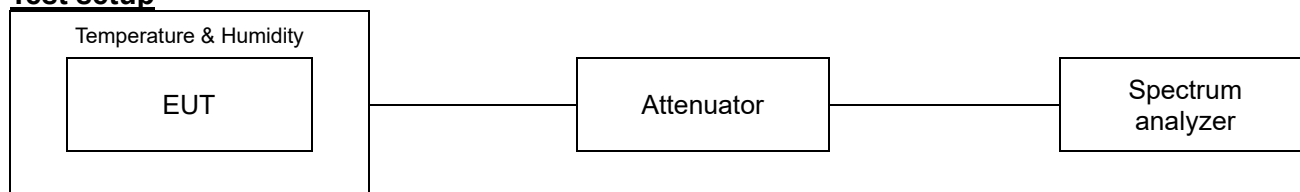


5 500 MHz



7.5. Frequency stability

Test setup



Limit

According to §15.407(g),

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

Test procedure

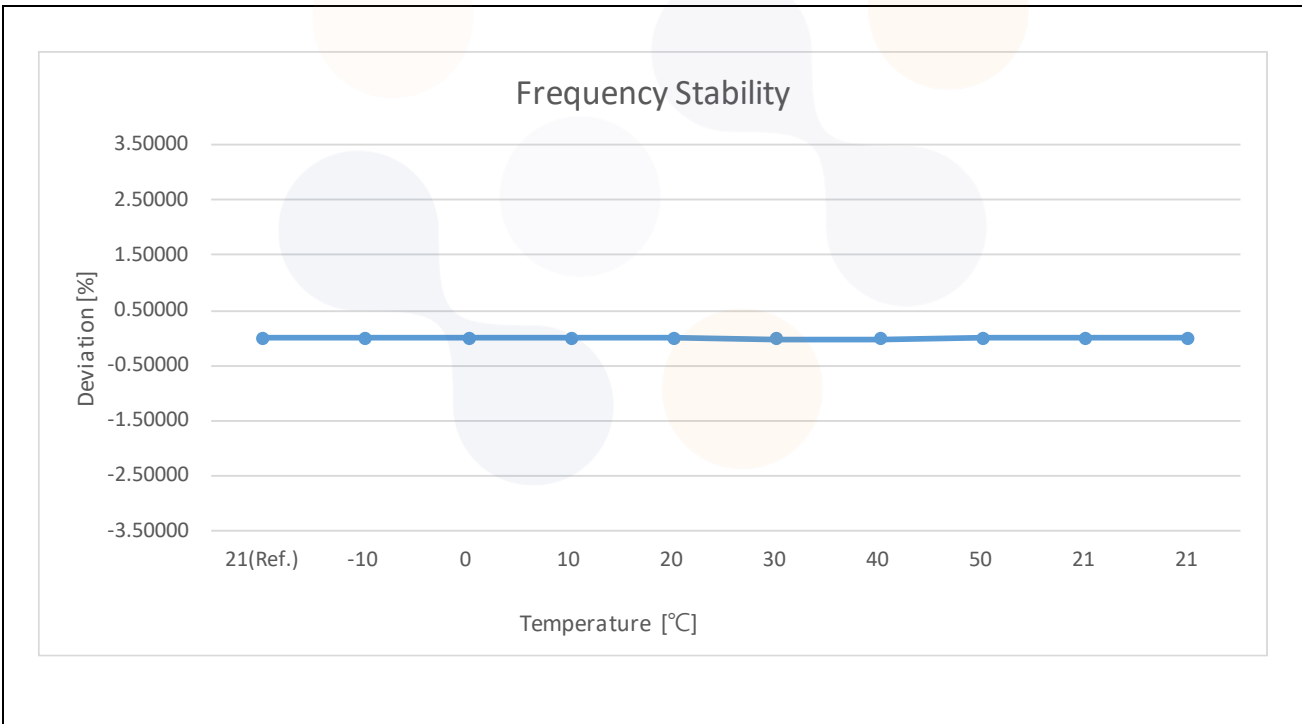
ANSI C63.10-2020 - Section 6.8



Test results

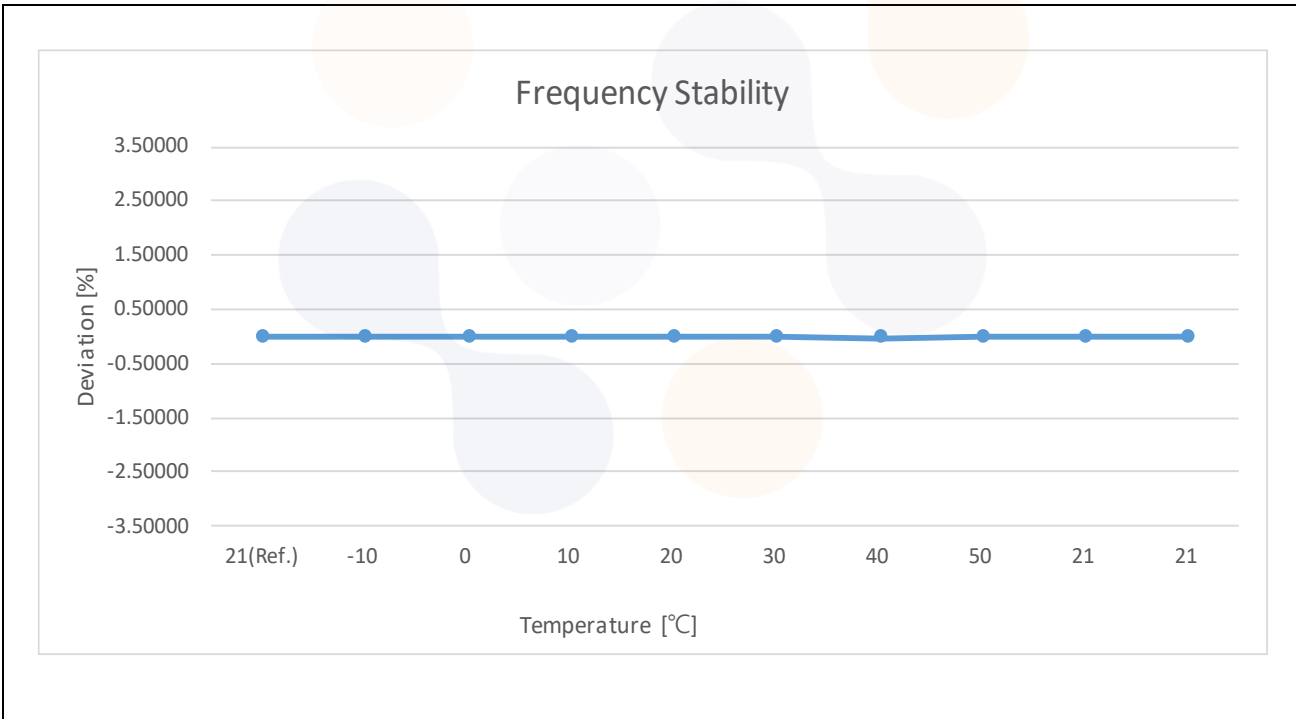
Test band : UNII-1
 Frequency (Hz) : 5 180 000 000

Voltage (%)	Power (V)	Temp. (°C)	Frequency (Hz)	Frequency error (Hz)	Deviation	
					(ppm)	(%)
100	5.00	22(Ref.)	5 180 028 170	28 170	5.44	0.000 54
		-10	5 180 022 980	22 980	4.44	0.000 44
		0	5 180 023 780	23 780	4.59	0.000 46
		10	5 180 023 580	23 580	4.55	0.000 46
		20	5 180 023 180	23 180	4.47	0.000 45
		30	5 180 022 580	22 580	4.36	0.000 44
		40	5 180 022 580	22 580	4.36	0.000 44
		50	5 180 023 180	23 180	4.47	0.000 45
85	4.25	21	5 180 026 370	26 370	5.09	0.000 51
115	5.75	21	5 180 025 170	25 170	4.86	0.000 49



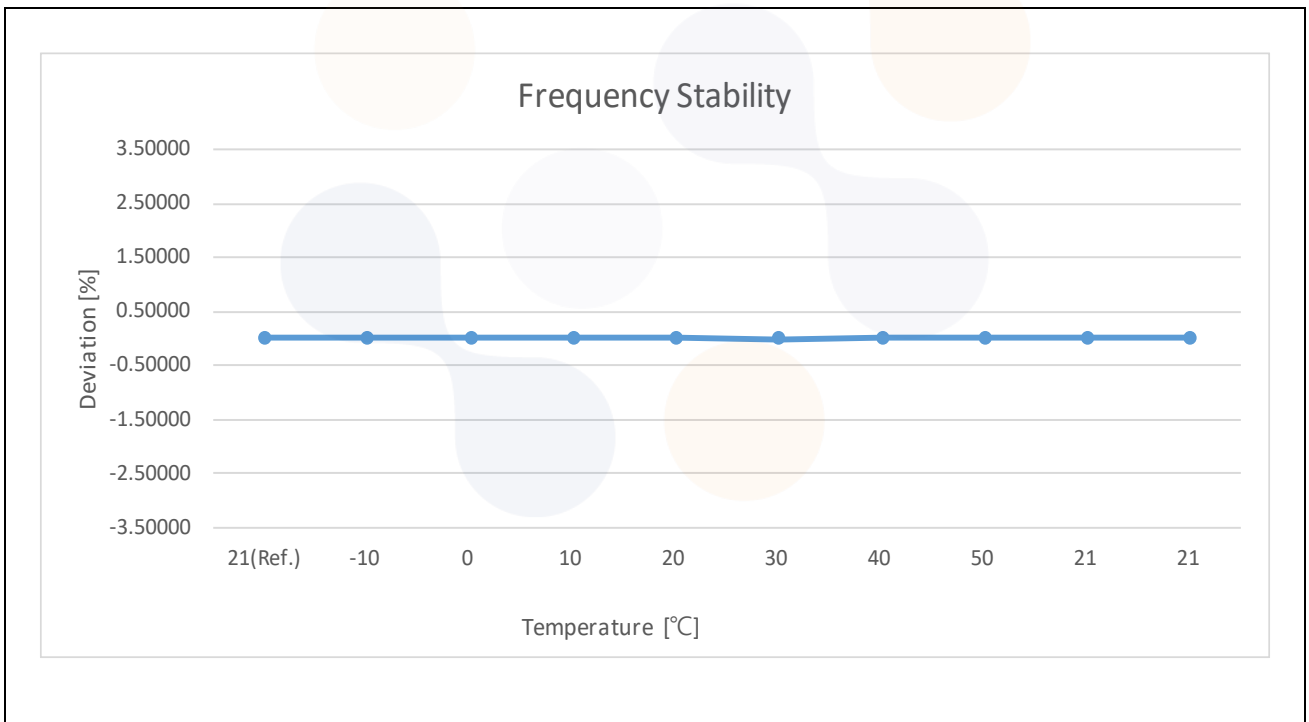
Test band : UNII-2A
 Frequency (Hz) : 5 260 000 000

Voltage (%)	Power (V)	Temp. (°C)	Frequency (Hz)	Frequency error (Hz)	Deviation	
					(ppm)	(%)
100	5.00	21(Ref.)	5 260 025 570	25 570	4.86	0.000 49
		-10	5 260 023 980	23 980	4.56	0.000 46
		0	5 260 023 980	23 980	4.56	0.000 46
		10	5 260 023 580	23 580	4.48	0.000 45
		20	5 260 023 780	23 780	4.52	0.000 45
		30	5 260 022 780	22 780	4.33	0.000 43
		40	5 260 022 580	22 580	4.29	0.000 43
		50	5 260 023 180	23 180	4.41	0.000 44
85	4.25	21	5 260 024 580	24 580	4.67	0.000 47
115	5.75	21	5 260 023 980	23 980	4.56	0.000 46



Test band : UNII-2C
 Frequency (Hz) : 5 500 000 000

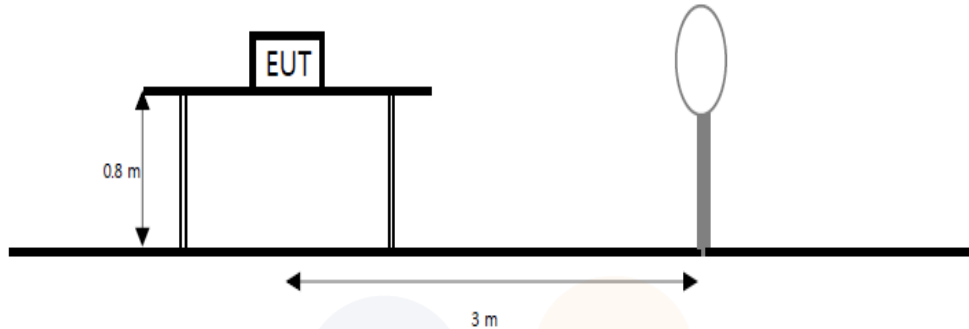
Voltage (%)	Power (V)	Temp. (°C)	Frequency (Hz)	Frequency error (Hz)	Deviation	
					(ppm)	(%)
100	5.00	21(Ref.)	5 500 025 170	25 170	4.58	0.000 46
		-10	5 500 024 980	24 980	4.54	0.000 45
		0	5 500 024 380	24 380	4.43	0.000 44
		10	5 500 024 380	24 380	4.43	0.000 44
		20	5 500 024 580	24 580	4.47	0.000 45
		30	5 500 023 580	23 580	4.29	0.000 43
		40	5 500 024 580	24 580	4.47	0.000 45
		50	5 500 024 380	24 380	4.43	0.000 44
85	4.25	21	5 500 024 380	24 380	4.43	0.000 44
115	5.75	21	5 500 024 180	24 180	4.40	0.000 44



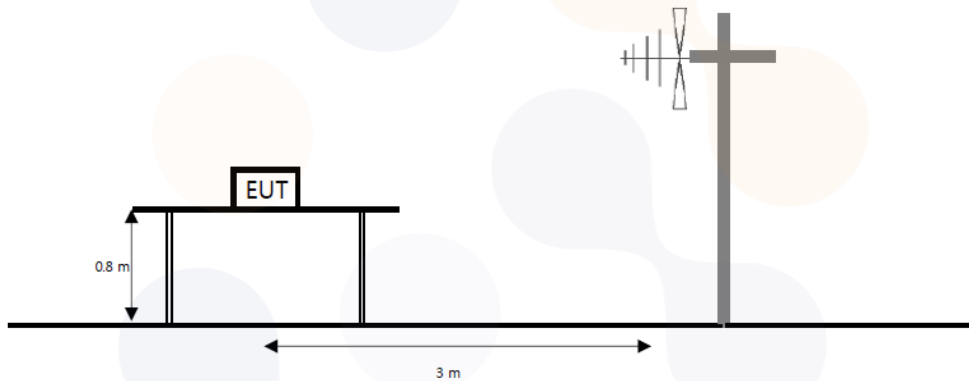
7.6. Spurious Emission, Band Edge and Restricted bands

Test setup

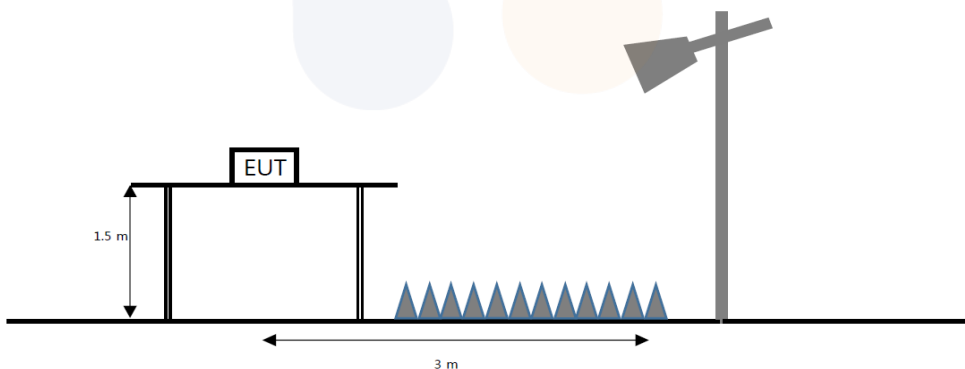
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz emissions, whichever is lower.



Limit

According to section 15.209(a),

except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength ($\mu V/m$)	Measurement distance (m)
0.009 - 0.490	2 400/F(kHz)	300
0.490 - 1.705	24 000/F(kHz)	30
1.705 - 30	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 MHz, 76–88 MHz, 174–216 MHz or 470–806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., Section 15.231 and 15.241.

According to section 15.205(a) and (b),

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.009 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.694 75 - 16.695 25	608 - 614	5.35 - 5.46
2.173 5 - 2.190 5	16.804 25 - 16.804 75	960 - 1 240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1 300 - 1 427	8.025 - 8.5
4.177 25 - 4.177 75	37.5 - 38.25	1 435 - 1 626.5	9.0 - 9.2
4.207 25 - 4.207 75	73 - 74.6	1 645.5 - 1 646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1 660 - 1 710	10.6 - 12.7
6.267 75 - 6.268 25	108 - 121.94	1 718.8 - 1 722.2	13.25 - 13.4
6.311 75 - 6.312 25	123 - 138	2 200 - 2 300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2 310 - 2 390	15.35 - 16.2
8.362 - 8.366	156.524 75 - 156.525	2 483.5 - 2 500	17.7 - 21.4
8.376 25 - 8.386 75	25	2 690 - 2 900	22.01 - 23.12
8.414 25 - 8.414 75	156.7 - 156.9	3 260 - 3 267	23.6 - 24.0
12.29 - 12.293	162.012 5 - 167.17	3 332 - 3 339	31.2 - 31.8
12.519 75 - 12.520 25	167.72 - 173.2	3 345.8 - 3 358	36.43 - 36.5
12.576 75 - 12.577 25	240 - 285	3 600 - 4 400	Above 38.6
13.36 - 13.41	322 - 335.4		

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in section 15.209. At frequencies equal to or less than 1 000 MHz, compliance with the limits in section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 MHz, compliance with the emission limits in section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in section 15.35 apply to these measurements.

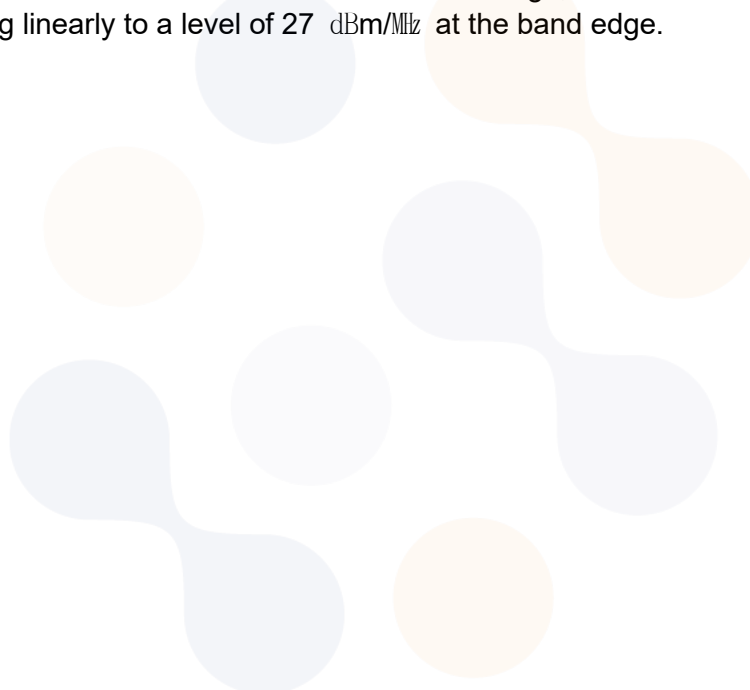
According to section 15.407(b),

undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz

For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.



Test procedure

ANSI C63.10-2020 Section 12.7.7.2, 12.7.5, 12.7.6

KDB 789033 D02 v02r01 – Section G

KDB 291074 D02 v01 – 2.10.2

Test settings

Peak field strength measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in table
3. VBW $\geq$ (3 $\times$ RBW)
4. Detector = peak
5. Sweep time = auto
6. Trace mode = max hold
7. Allow sweeps to continue until the trace stabilizes

Table. RBW as a function of frequency

Frequency	RBW
9 kHz to 150 kHz	200 Hz to 300 Hz
0.15 MHz to 30 MHz	9 kHz to 10 kHz
30 MHz to 1 000 MHz	100 kHz to 120 kHz
> 1 000 MHz	1 MHz

Average field strength measurements

Trace averaging with continuous EUT transmission at full power

If the EUT can be configured or modified to transmit continuously ($D \geq 98\%$), then the average emission levels shall be measured using the following method (with EUT transmitting continuously):

1. RBW = 1 MHz (unless otherwise specified).
2. VBW $\geq$ (3 $\times$ RBW).
3. Detector = RMS (power averaging), if $[\text{span} / (\# \text{ of points in sweep})] \leq (\text{RBW} / 2)$. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
4. Averaging type = power (i.e., rms):
 - 1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
 - 2) Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.
5. Sweep time = auto.
6. Perform a trace average of at least 100 traces.

Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction

If continuous transmission of the EUT ($D \geq 98\%$) cannot be achieved and the duty cycle is constant (duty cycle variations are less than $\pm 2\%$), then the following procedure shall be used:

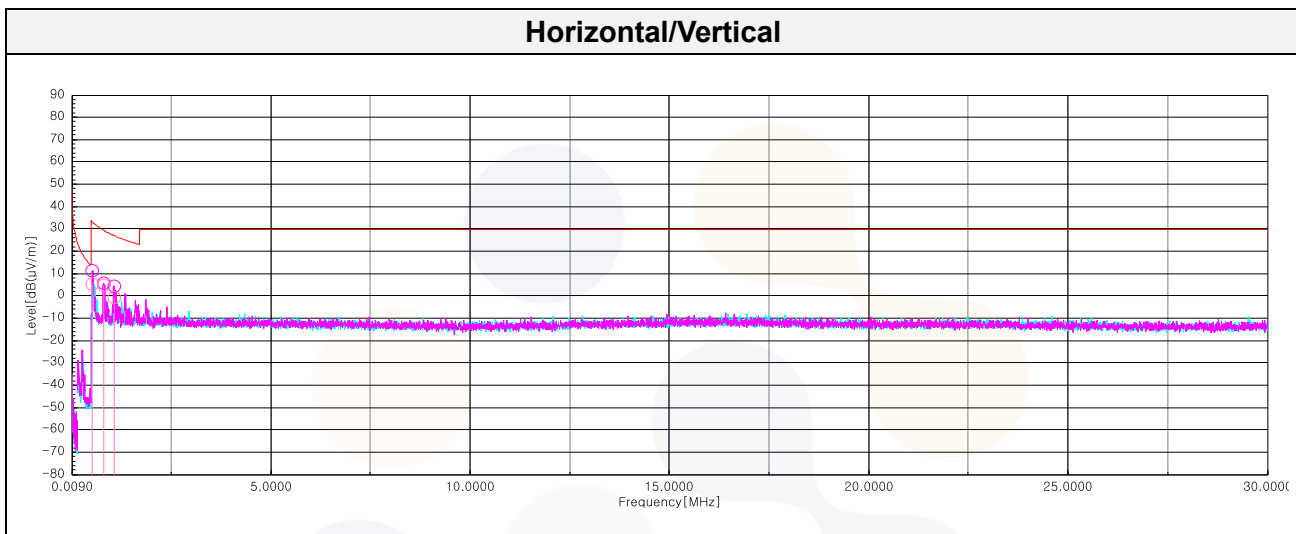
1. The EUT shall be configured to operate at the maximum achievable duty cycle.
2. Measure the duty cycle D of the transmitter output signal as described in 11.6.
3. $RBW = 1 \text{ MHz}$ (unless otherwise specified).
4. $VBW \geq [3 \times RBW]$.
5. Detector = RMS (power averaging), if $[\text{span} / (\# \text{ of points in sweep})] \leq (RBW / 2)$. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
6. Averaging type = power (i.e., rms):
 - 1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
 - 2) Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.
7. Sweep time = auto.
8. Perform a trace average of at least 100 traces.
9. A correction factor shall be added to the measurement results prior to comparing with the emission limit to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:
 - 1) If power averaging (rms) mode was used in step f), then the applicable correction factor is $[10 \log (1 / D)]$, where D is the duty cycle.
 - 2) If linear voltage averaging mode was used in step f), then the applicable correction factor is $[20 \log (1 / D)]$, where D is the duty cycle.
 - 3) If a specific emission is demonstrated to be continuous ($D \geq 98\%$) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission.

Notes:

1. $f < 30 \text{ MHz}$, extrapolation factor of 40 dB/decade of distance. $F_d = 40 \log(D_m/D_s)$
 $f \geq 30 \text{ MHz}$, extrapolation factor of 20 dB/decade of distance. $F_d = 20 \log(D_m/D_s)$
 Where:
 F_d = Distance factor in dB
 D_m = Measurement distance in meters
 D_s = Specification distance in meters
2. $\text{Factors(dB)} = \text{Antenna factor(dB/m)} + \text{Cable loss(dB)} + \text{or Amp. gain(dB)} + \text{or } F_d(\text{dB})$
3. The worst-case emissions are reported however emissions whose levels were not within 20 dB of respective limits were not reported.
4. Average test would be performed if the peak result were greater than the average limit.
5. ¹⁾ means restricted band.
6. Below 30 MHz frequency range, In order to search for the worst result, all orientations about parallel, perpendicular, and ground-parallel were investigated then reported. when the emission level was higher than 20 dB of the limit, then the following statement shall be made: "No spurious emissions were detected within 20 dB of the limit."
7. Above 1 GHz the worst results between two antenna polarizations (H and V) were documented in the test report.
8. For above 1 GHz pre-scan to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 kHz for peak measurements.
9. The contribution from non-harmonic components was calculated separately using the duty cycle and applied accordingly.

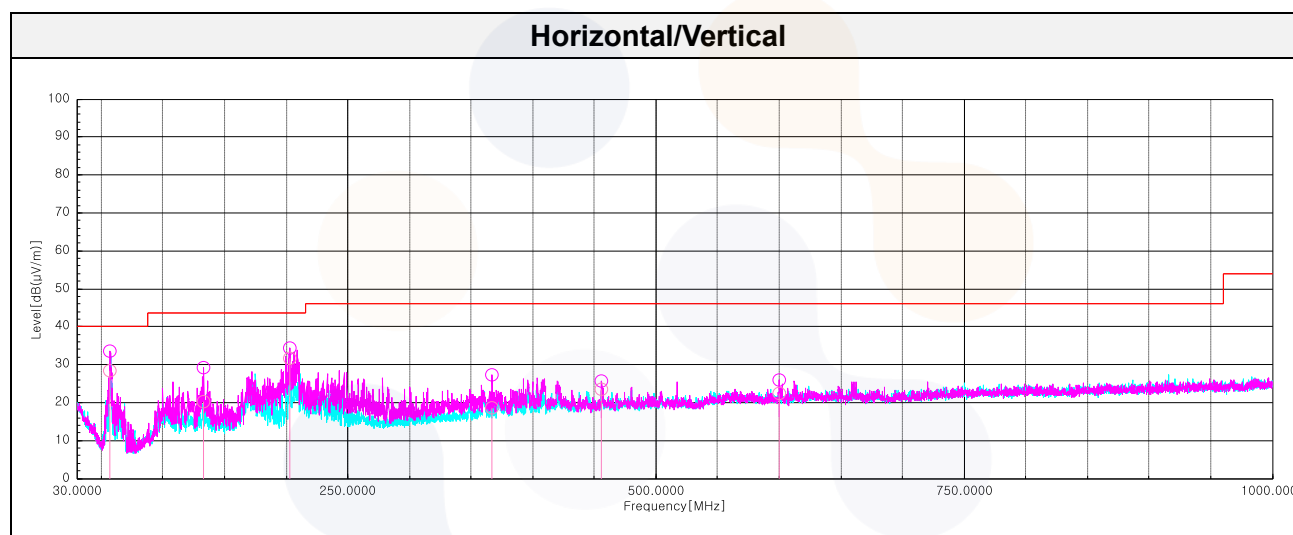
Test results (Below 30 MHz) – Worst case: 802.11a / UNII 2C_5 580 MHz

Frequency	Pol.	Reading	Ant. Factor	Amp. + Cable	DCCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Quasi peak data								
0.53	H	57.60	20.21	-32.69	40.00	5.12	33.05	27.93
0.80	H	57.40	20.26	-32.67	40.00	4.99	29.54	24.55
1.07	H	51.70	20.30	-32.65	40.00	-0.65	27.10	27.75



Test results (Below 1 000 MHz) – Worst case: 802.11a / UNII 2C_5 580 MHz

Frequency	Pol.	Reading	Ant. Factor	Amp. + Cable	DCCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Quasi peak data								
57.28	H	48.20	12.27	-32.21	-	28.26	40.00	11.74
133.31 ¹⁾	H	33.90	17.80	-31.43	-	20.27	43.52	23.25
202.66	H	47.50	15.23	-31.09	-	31.64	43.52	11.88
367.20	H	28.60	20.90	-30.93	-	18.57	46.02	27.45
456.07	H	31.20	22.80	-30.54	-	23.46	46.02	22.56
600.00	H	28.40	24.50	-30.43	-	22.47	46.02	23.55



Test results (Above 1 000 MHz)

UNII 1

802.11a_Lowest Channel (5 180 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
5 091.95 ¹⁾	V	44.90	33.18	-27.74	-	50.34	74.00	23.66
7 251.33 ¹⁾	V	57.60	36.60	-38.84	-	55.36	74.00	18.64
10 311.10	H	53.30	38.90	-39.98	-	52.22	68.20	15.98
15 546.67 ¹⁾	H	51.90	38.71	-37.90	-	52.71	74.00	21.29
Average Data								
7 251.33 ¹⁾	V	49.21	36.60	-38.84	0.47	47.44	54.00	6.56

802.11a_Middle Channel (5 200 MHz)

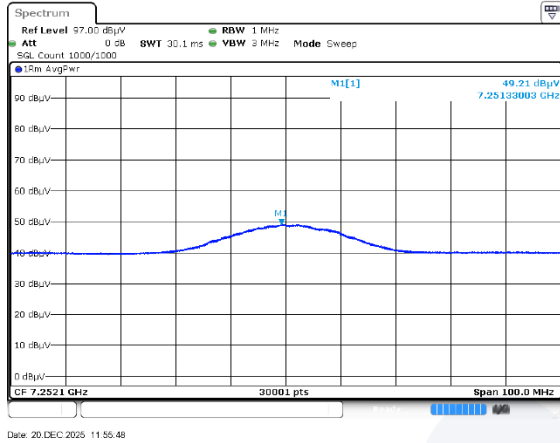
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
7 279.45 ¹⁾	V	59.30	36.66	-38.82	-	57.14	74.00	16.86
10 472.10	V	53.70	38.80	-40.00	-	52.50	68.20	15.70
15 631.00 ¹⁾	V	51.00	38.64	-37.64	-	52.00	74.00	22.00
Average Data								
7 279.45 ¹⁾	V	49.23	36.66	-38.82	0.27	47.34	54.00	6.66

802.11a_Highest Channel (5 240 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
7 335.32 ¹⁾	V	59.30	36.43	-38.78	-	56.95	74.00	17.05
10 493.57	V	53.40	38.80	-40.00	-	52.20	68.20	16.00
15 754.43 ¹⁾	H	51.70	38.70	-37.27	-	53.13	74.00	20.87
Average Data								
7 335.32 ¹⁾	V	51.13	36.43	-38.78	0.28	49.06	54.00	4.94

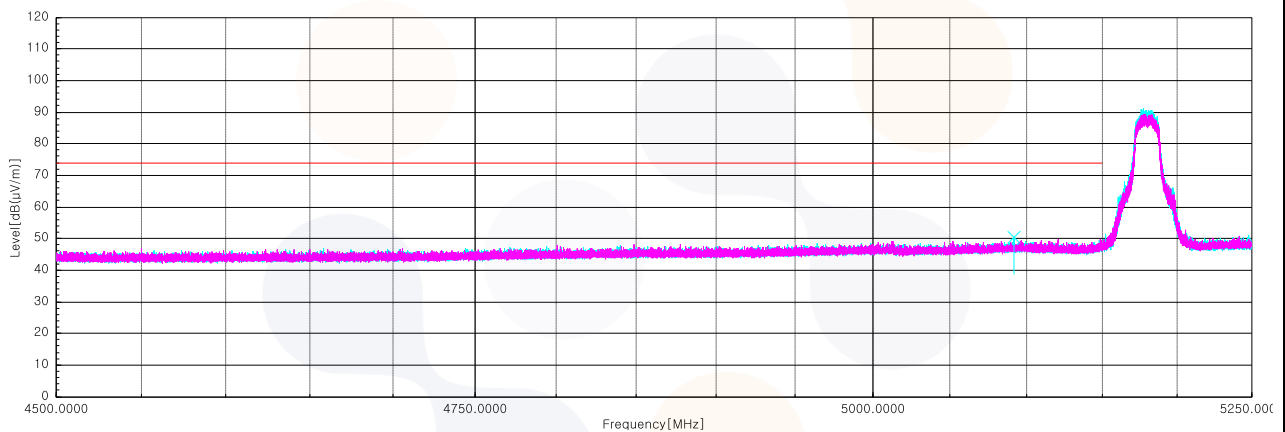
802.11a_Lowest Channel (5 180 MHz)

Average data



Blank

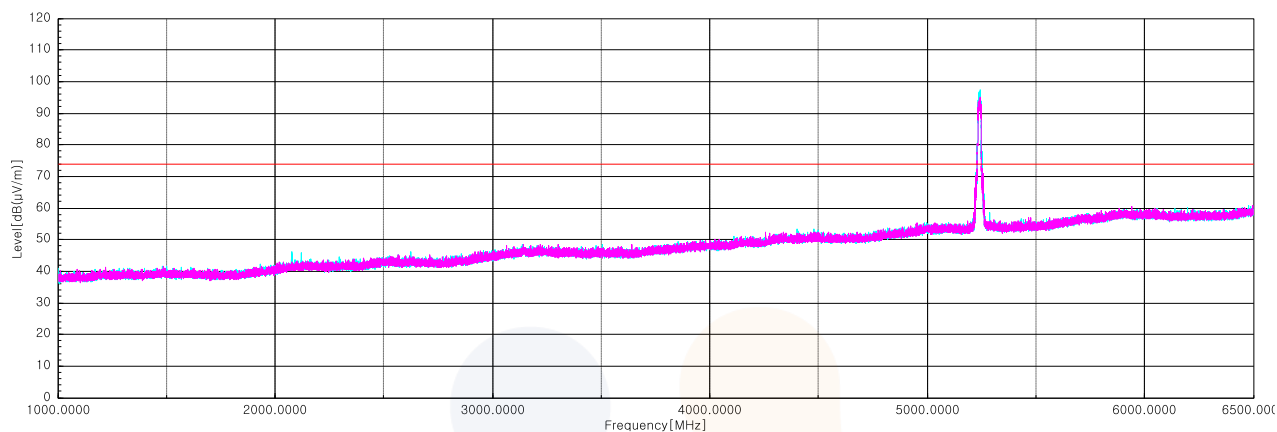
Horizontal/Vertical for Band-edge



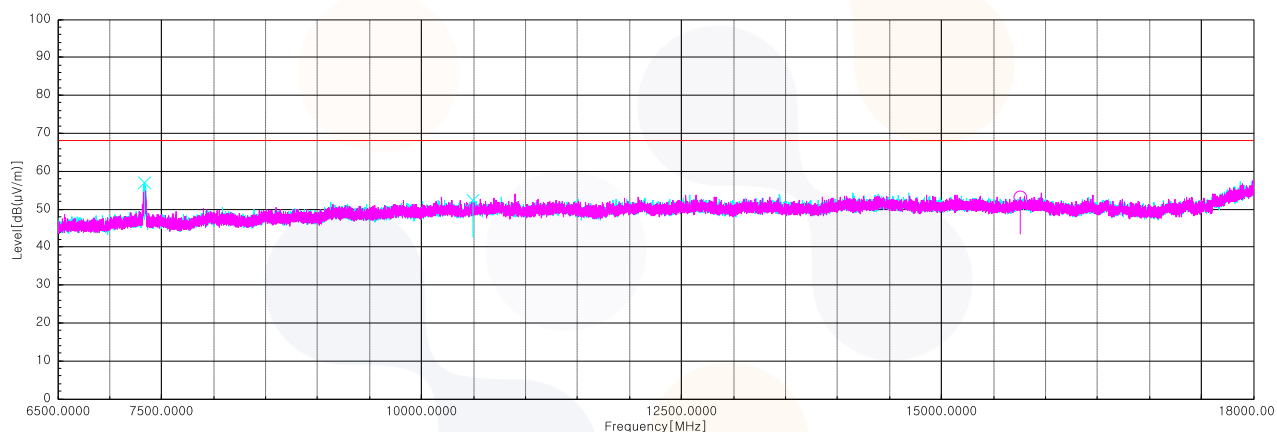
Plot of Harmonics and Spurious Emissions

In order to simplify the report, attached plots were only the lowest margin condition
UNII 1_802.11a_Highest Channel (5 240 MHz)

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Horizontal/Vertical for 18 GHz ~ 40 GHz

