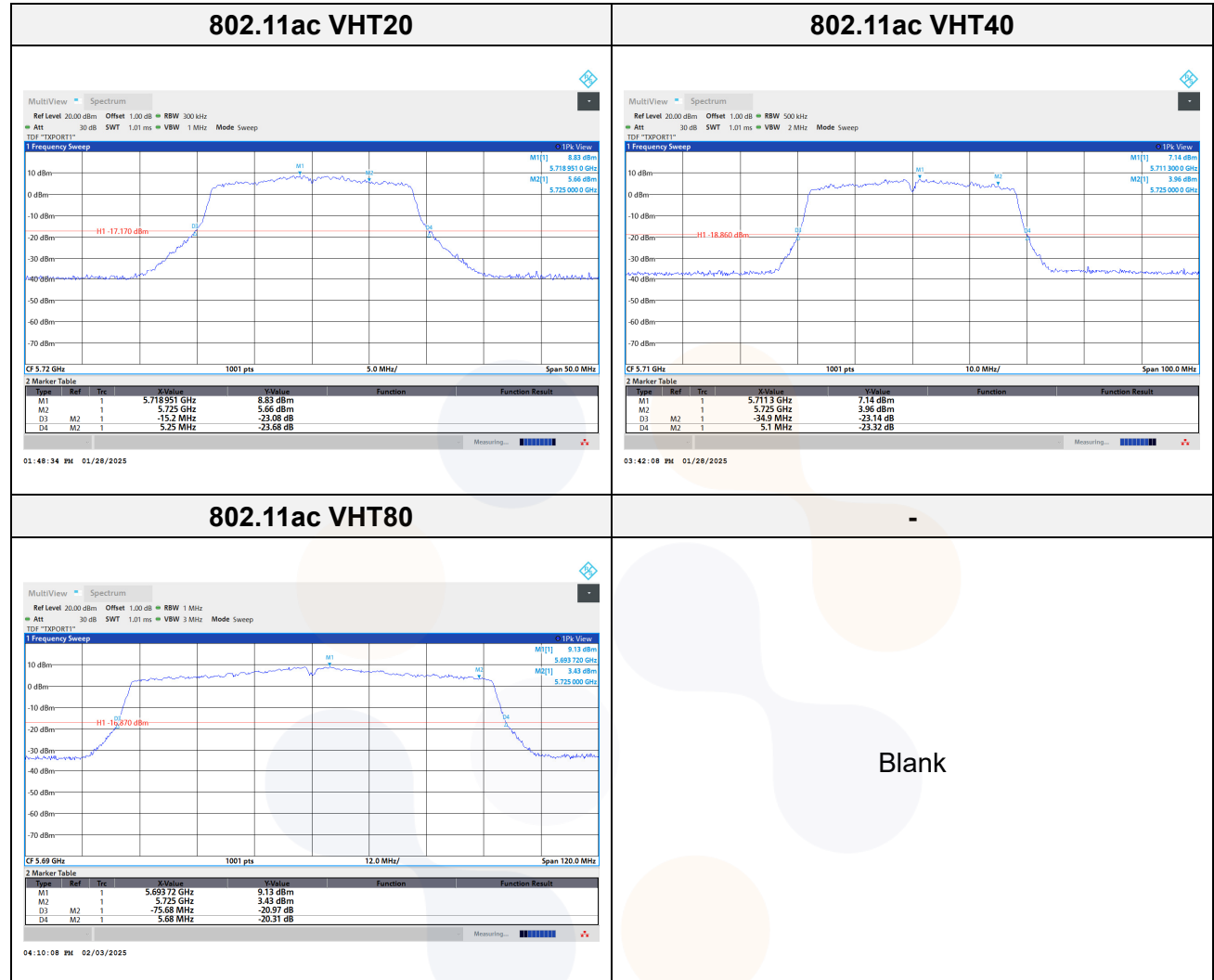


In order to simplify the report, only MIMO ANT1 ac mode test plots are attached

MIMO



6dB bandwidth

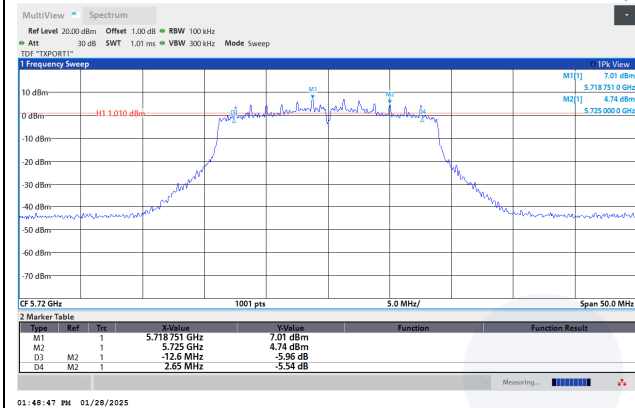
MIMO

Test mode	Band	Frequency (MHz)	6dB Bandwidth (MHz)		Limit (MHz)
			ANT1	ANT2	
802.11a	UNII 3	5 720	2.65	2.60	0.50
802.11n HT20			2.65	2.60	0.50
802.11ac VHT20			2.65	2.65	0.50
802.11n HT40	UNII 3	5 710	2.70	2.70	0.50
802.11ac VHT40			2.70	2.70	0.50
802.11ac VHT80	UNII 3	5 690	2.68	2.52	0.50

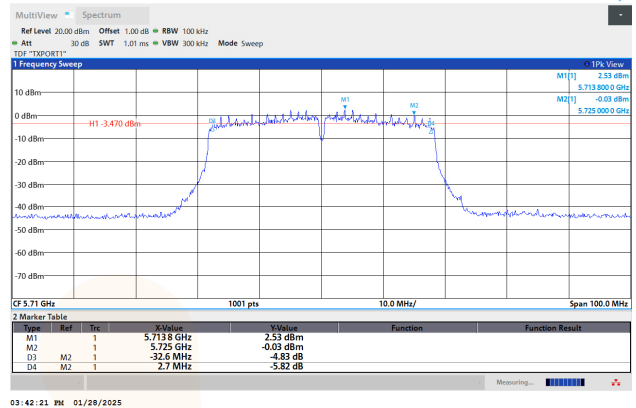
In order to simplify the report, only MIMO ANT1 ac mode test plots are attached

MIMO

802.11ac VHT20



802.11ac VHT40



802.11ac VHT80



Blank

Output Power

MIMO

Conducted output power

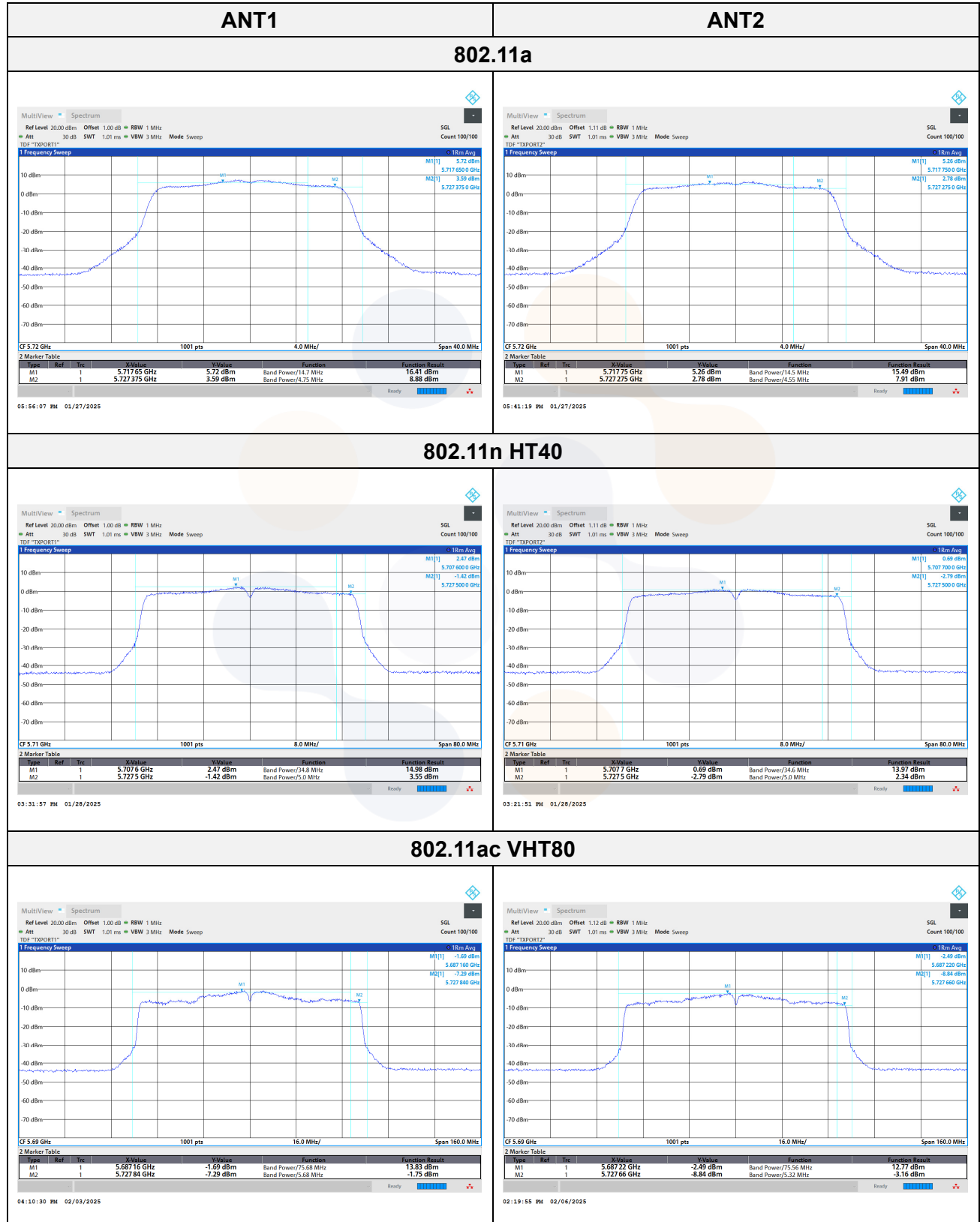
Test mode	Band	Frequency (MHz)	Measured output power				Limit (dBm)
			Reading (dBm)		DCF (dB)	Result (dBm)	
			ANT1	ANT2			
802.11a	UNII 2C	5 720	16.41	15.49	0.28	19.26	22.61
802.11n HT20			15.14	14.50	0.61	18.45	22.80
802.11ac VHT20			15.07	14.54	0.61	18.43	22.73
802.11a	UNII 3	5 720	8.88	7.91	0.28	11.71	30.00
802.11n HT20			8.12	7.49	0.61	11.44	30.00
802.11ac VHT20			8.03	7.40	0.61	11.35	30.00
802.11n HT40	UNII 2C	5 710	14.98	13.97	1.11	18.62	23.98
802.11ac VHT40			14.11	13.29	1.10	17.83	23.98
802.11n HT40	UNII 3	5 710	3.55	2.34	1.11	7.11	30.00
802.11ac VHT40			2.60	1.43	1.10	6.16	30.00
802.11ac VHT80	UNII 2C	5 690	13.83	12.77	1.86	18.20	23.98
	UNII 3	5 690	-1.75	-3.16	1.86	2.47	30.00

Notes:

- Conducted Output power(dBm) = Reading $10\log(10^{(ANT1/10)} + 10^{(ANT2/10)})$ (dBm) + D.C.F (dB)

In order to simplify the report, attached plots were the worst case per bandwidth

MIMO



Power Spectral Density

MIMO

Test mode	Band	Frequency (MHz)	Measured PSD (dBm/MHz)		DCF (dB)	Maximum PSD (dB m/MHz)	Limit (dBm/MHz)
			ANT1	ANT2			
802.11a	UNII 2C	5 720	6.77	6.43	0.28	9.90	11.00
802.11n HT20			5.99	5.33	0.61	9.29	
802.11ac VHT20			6.24	5.30	0.61	9.41	
802.11n HT40		5 710	2.65	1.63	1.11	6.29	
802.11ac VHT40			1.98	0.48	1.10	5.41	
802.11ac VHT80		5 690	-1.27	-1.63	1.86	3.42	

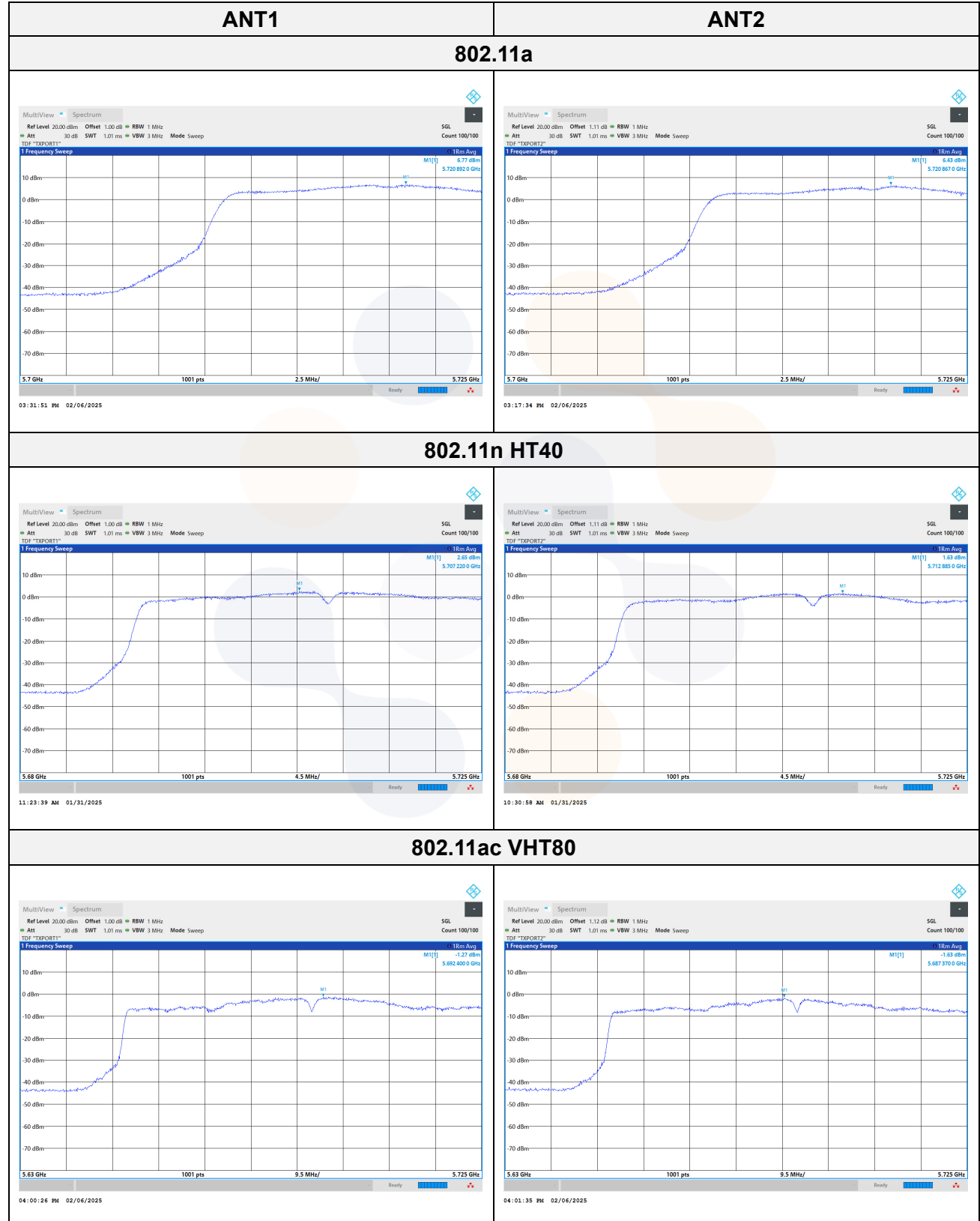
Test mode	Band	Frequency (MHz)	Measured PSD (dBm/500 kHz)		DCF (dB)	Maximum PSD (dB m/500 kHz)	Limit (dBm/500 kHz)
			ANT1	ANT2			
802.11a	UNII 3	5 720	1.77	0.43	0.28	4.44	30.00
802.11n HT20			0.82	0.05	0.61	4.07	
802.11ac VHT20			0.78	0.12	0.61	4.08	
802.11n HT40		5 710	-3.23	-4.26	1.11	0.41	
802.11ac VHT40			-3.87	-5.35	1.10	-0.44	
802.11ac VHT80		5 690	-8.55	-9.46	1.86	-4.11	

Notes:

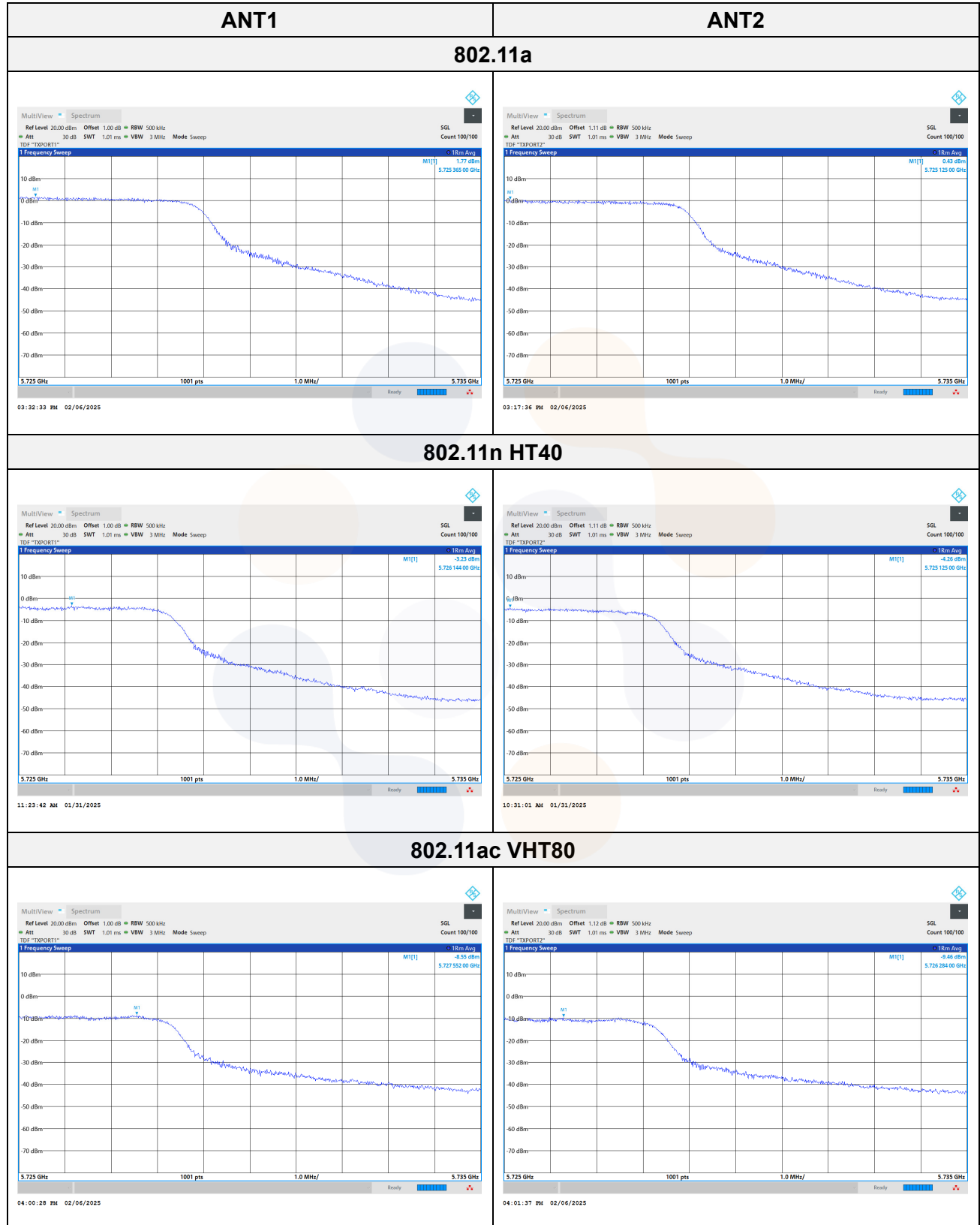
- Maximum PSD(dB m/MHz) = $10\log(10^{(ANT1/10)} + 10^{(ANT2/10)})$ (dB m/MHz) + D.C.F(dB)

In order to simplify the report, attached plots were the worst case per bandwidth

MIMO UNII-2C



MIMO UNII-3



8.6. DFS (Dynamic Frequency Selection)

Test description

- Applicability of DFS requirements prior to use of a channel

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

- Applicability of DFS requirements during normal operation

Requirement	Operational Mode	
	Master Device or Client with Radar Detection	Client Without Radar Detection
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	Client Without Radar Detection
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 power spectral density < 10 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 (μ sec)	PRI (μ sec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	See Note 1	See Note 1
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 μ sec, with a minimum increment of 1 μ sec, 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

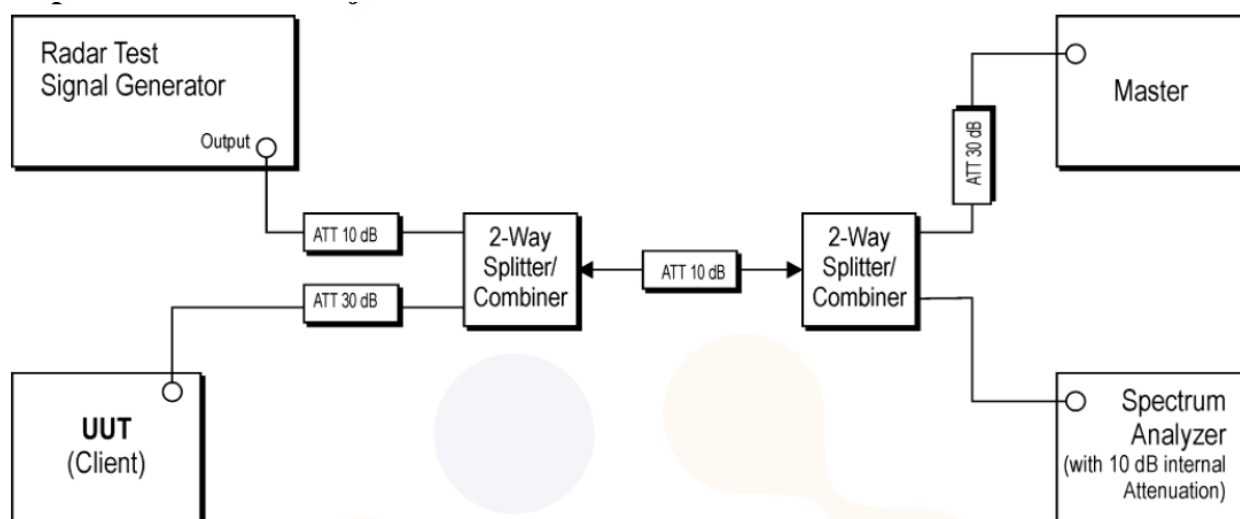
*Long Pulse Radar Test Waveform

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.

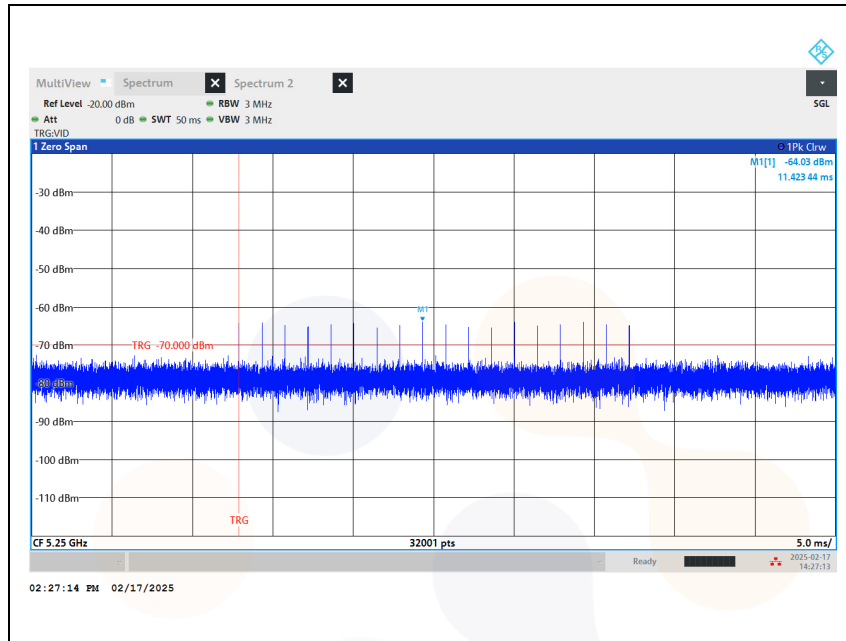
- Master device information

Equipment Name	Manufacturer	Model No.	Serial No.	FCC ID
Access Point	ASUSTeK Computer Inc	GT-AXE11000	M6IAJF202801	MSQ-RTAXJF00

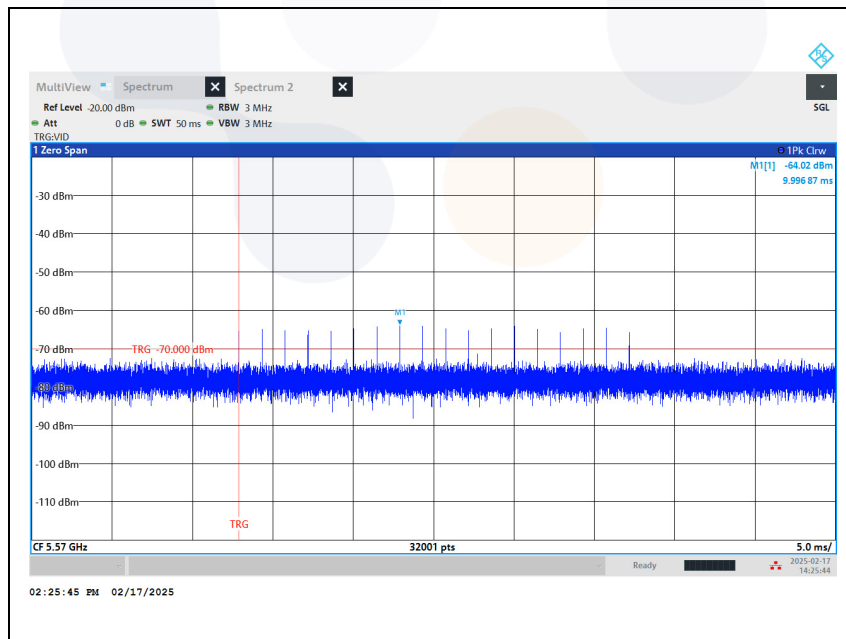
Test result

Plot of radar waveform

5 250 MHz

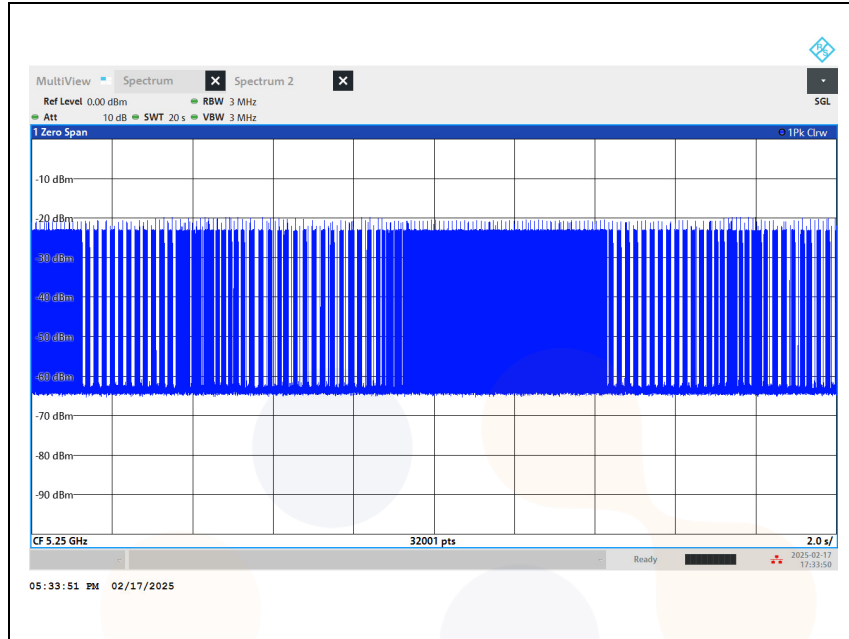


5 570 MHz

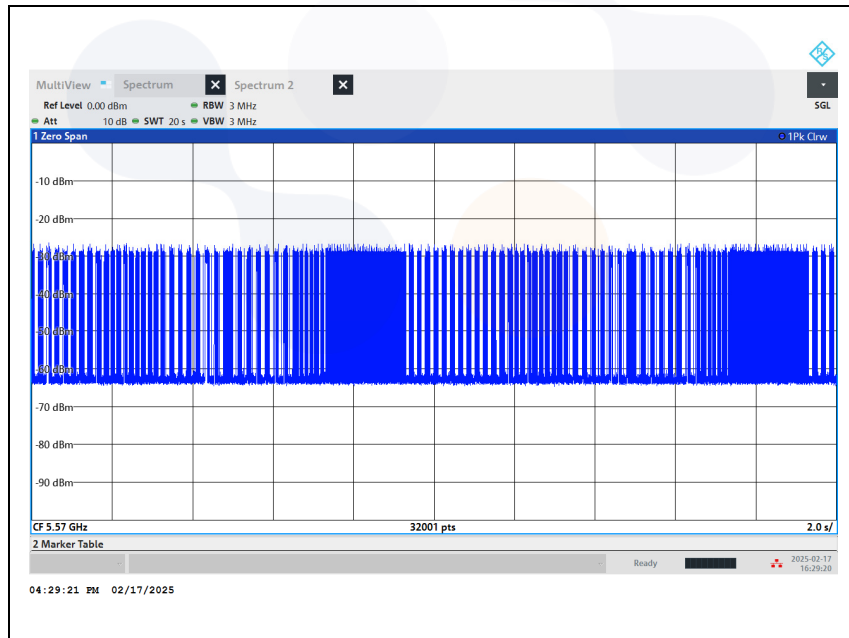


Plot of LAN traffic

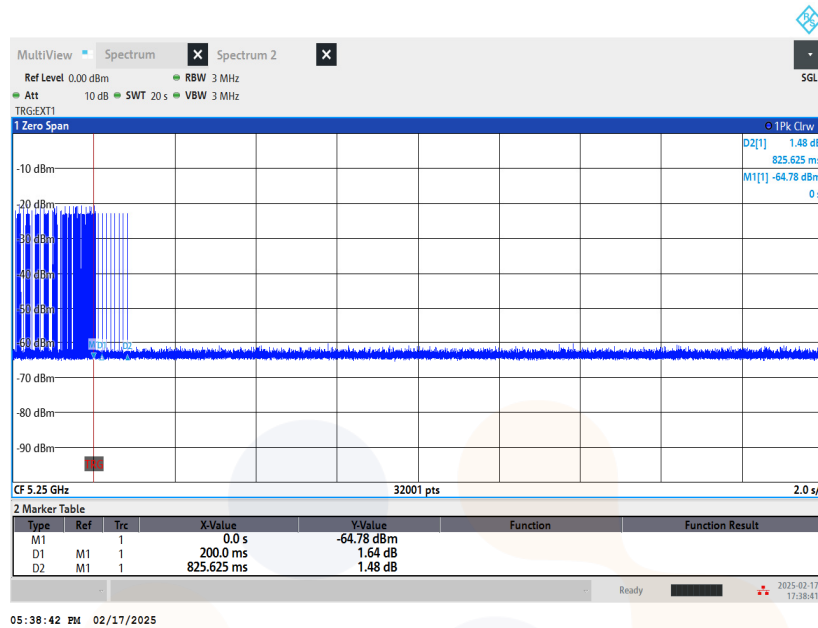
5 250 MHz



5 570 MHz



Plot of channel move time and aggregate time



Channel move time = 0.825 625 s
Closing time = 0.000 625 s x 34 = 0.021 250 s
(Closing time : Burst unit time(20 s / 32 001 points) * Number of burst(between 2 markers))

UNII 2A: 802.11 ac VHT160, 5 250 MHz

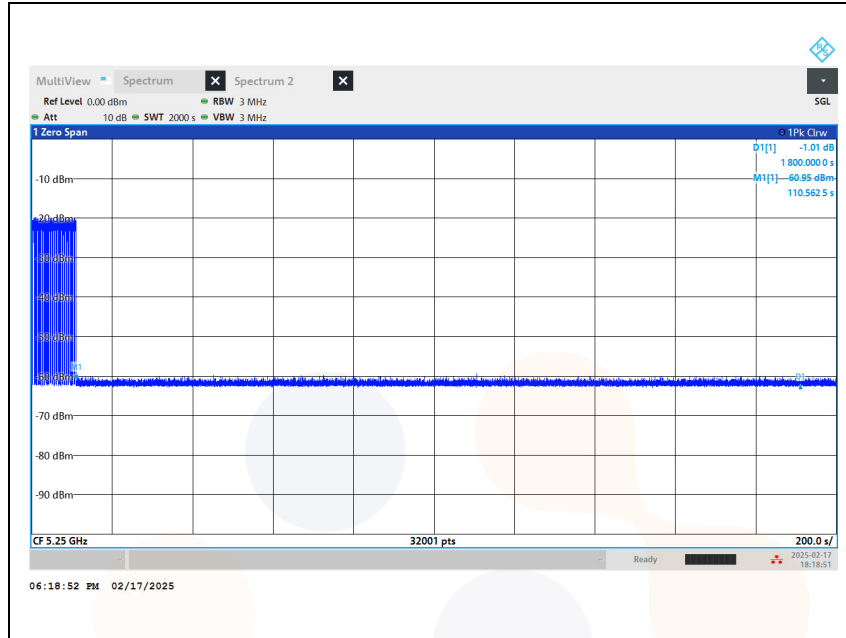


Channel move time = 0.785 250 s
Closing time = 0.000 625 s x 16 = 0.010 000 s
(Closing time : Burst unit time(20 s / 32 001 points) * Number of burst(between 2 markers))

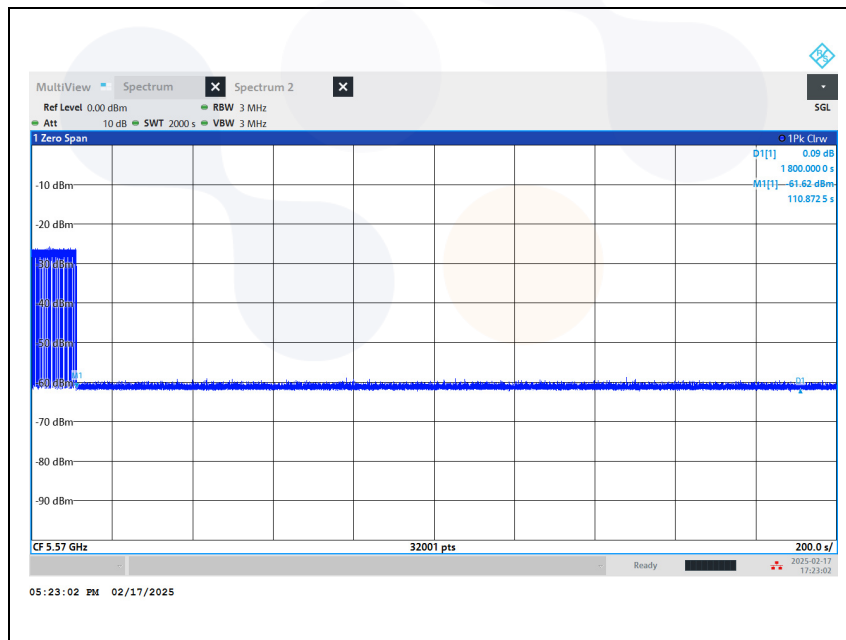
UNII 2C: 802.11 ac VHT160, 5 570 MHz

Plot of Non-occupancy period

5 250 MHz



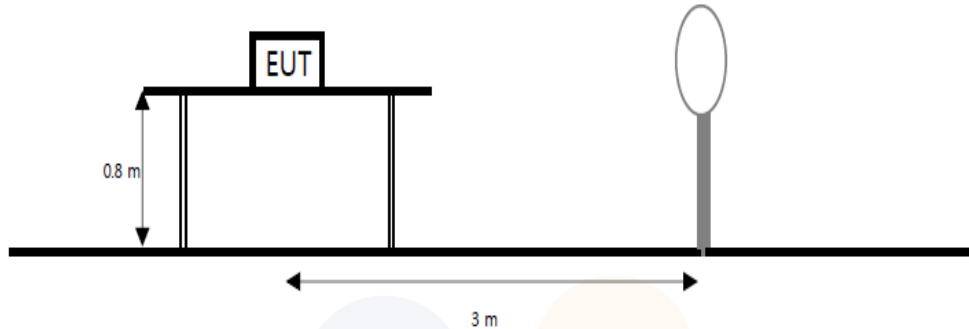
5 570 MHz



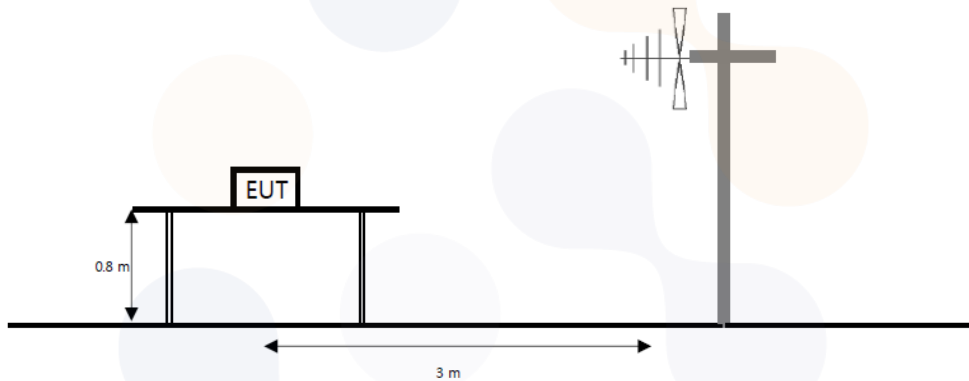
8.7. Spurious Emission, Band Edge and Restricted bands

Test setup

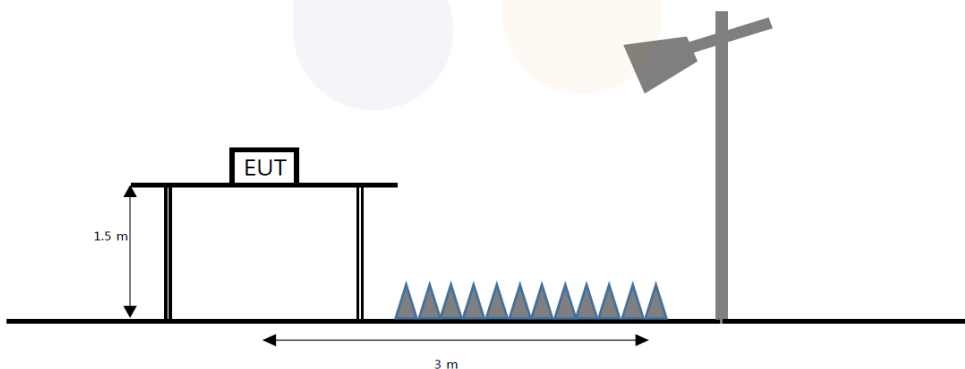
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions



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 25	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.