

IEEE 802.11ac VHT40 mode ANT4

Lowest Channel

Frequency 5230MHz

Environment: 23.5°C/47%RH 101.0kPa

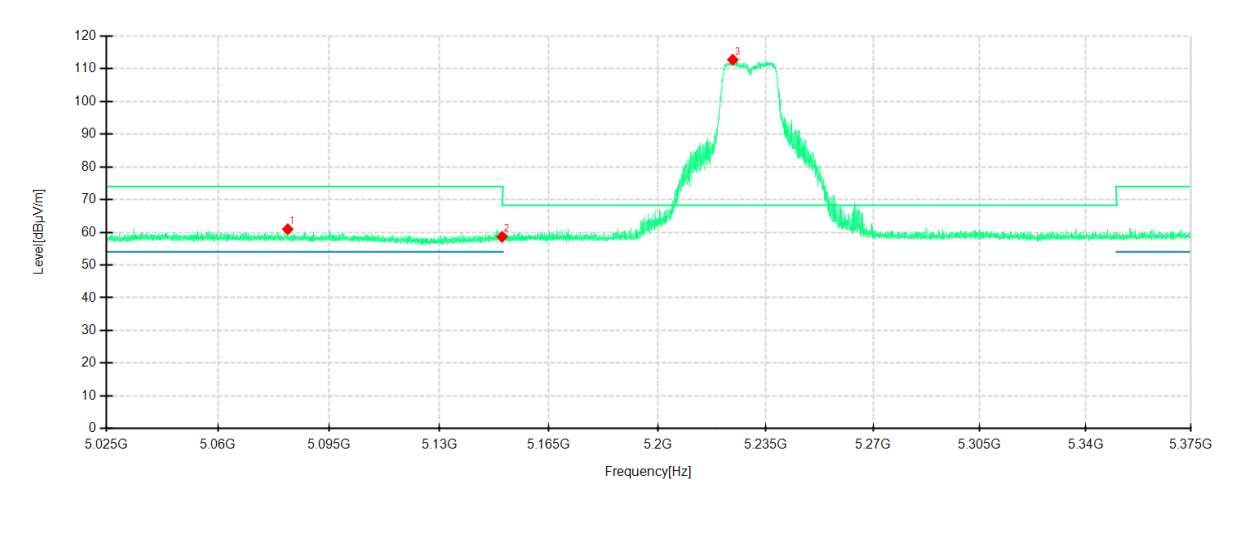
Tested By: Zhang Zishan

Detector mode: Peak

Voltage: AC 120V/60Hz

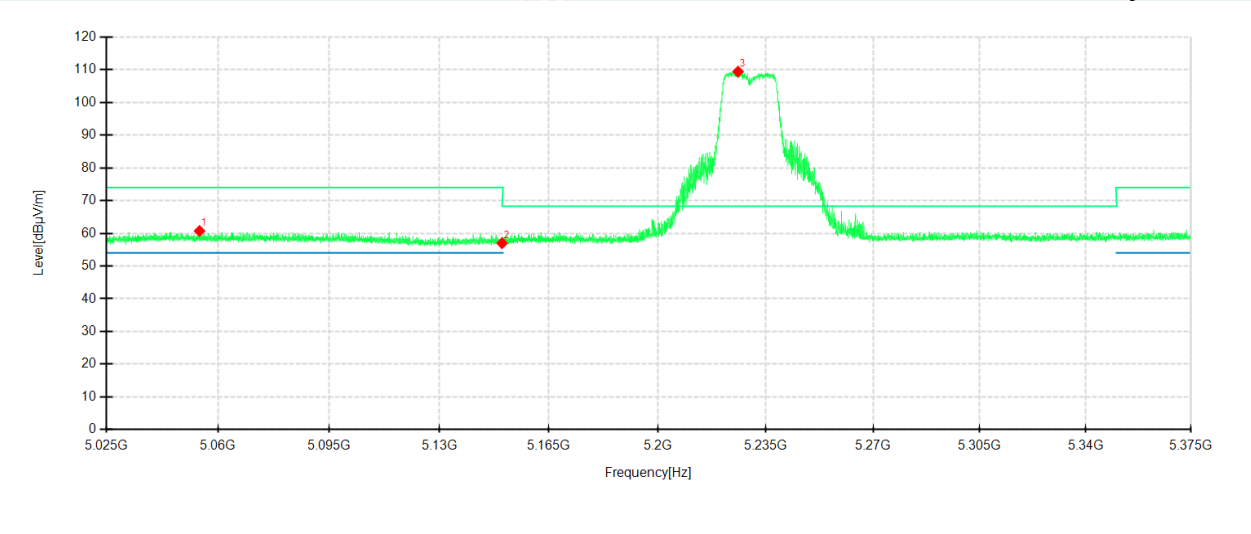
Date: 2023-11-25

Polarity: Horizontal



Detector mode: Peak

Polarity: Vertical

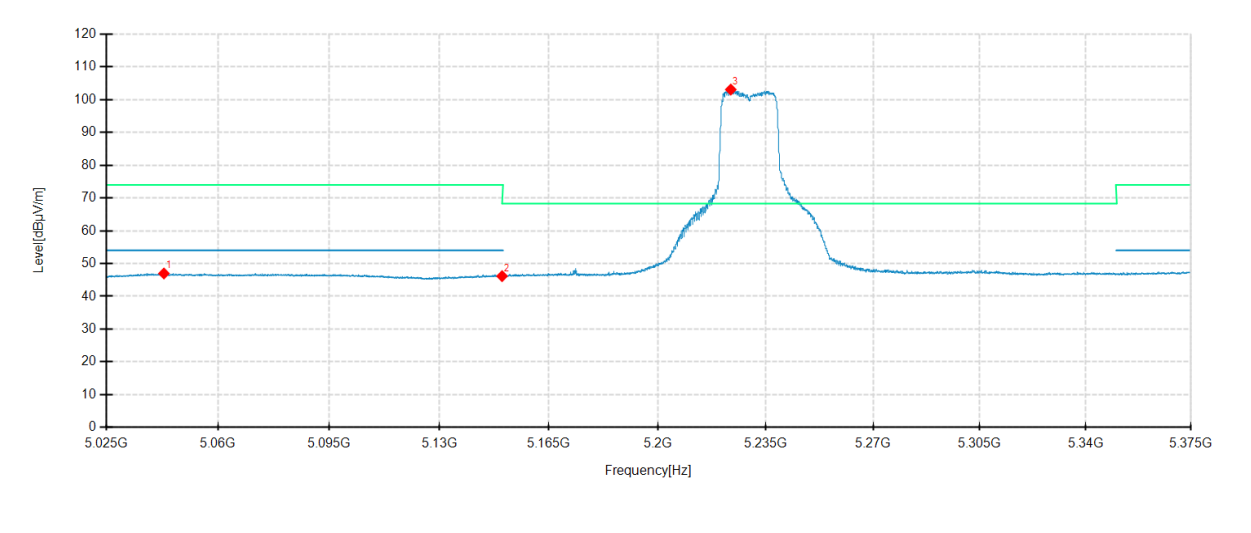


No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Comment
1	5081.9188	45.79	60.96	15.17	74.00	13.04	100	65	Horizontal	/
2	5150.0000	43.63	58.63	15.00	68.30	9.67	100	224	Horizontal	/
3	5224.2813	97.11	112.75	15.64	68.30	-44.45	100	138	Horizontal	No limit
1	5054.1813	45.63	60.72	15.09	74.00	13.28	100	210	Vertical	/
2	5150.0000	42.19	56.99	14.80	68.30	11.31	100	107	Vertical	/
3	5225.9875	94.09	109.40	15.31	68.30	-41.10	100	65	Vertical	No limit

IEEE 802.11ac VHT40 mode ANT4
Highest Channel

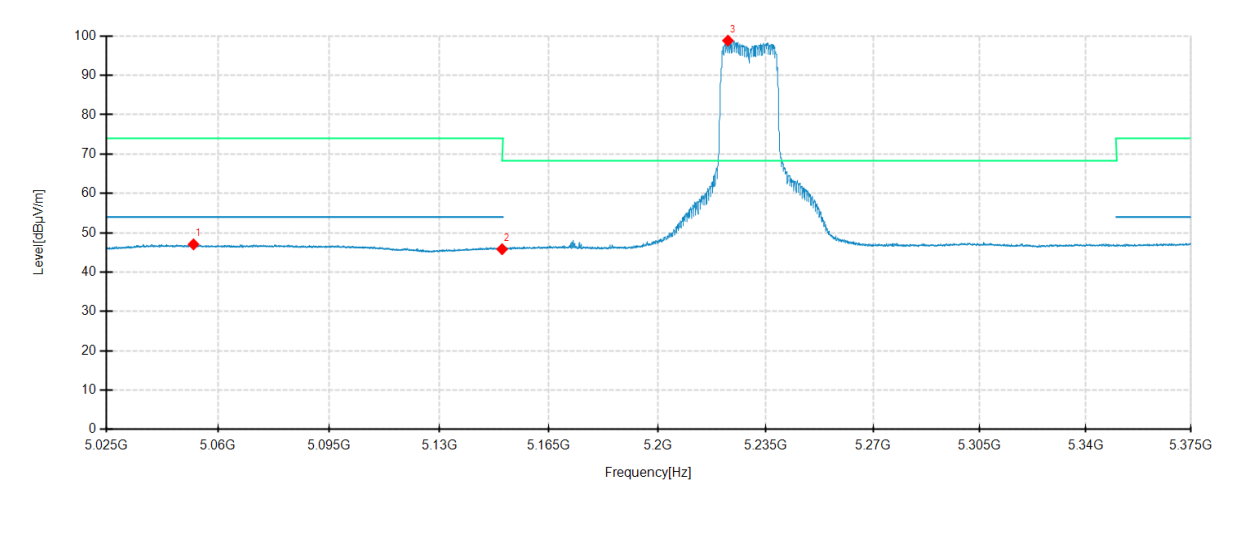
Frequency 5230MHz
Environment: 23.5°C/47%RH 101.0kPa
Tested By: Zhang Zishan
Detector mode: Average

Voltage: AC 120V/60Hz
Date: 2023-11-25
Polarity: Horizontal



Detector mode: Average

Polarity: Vertical

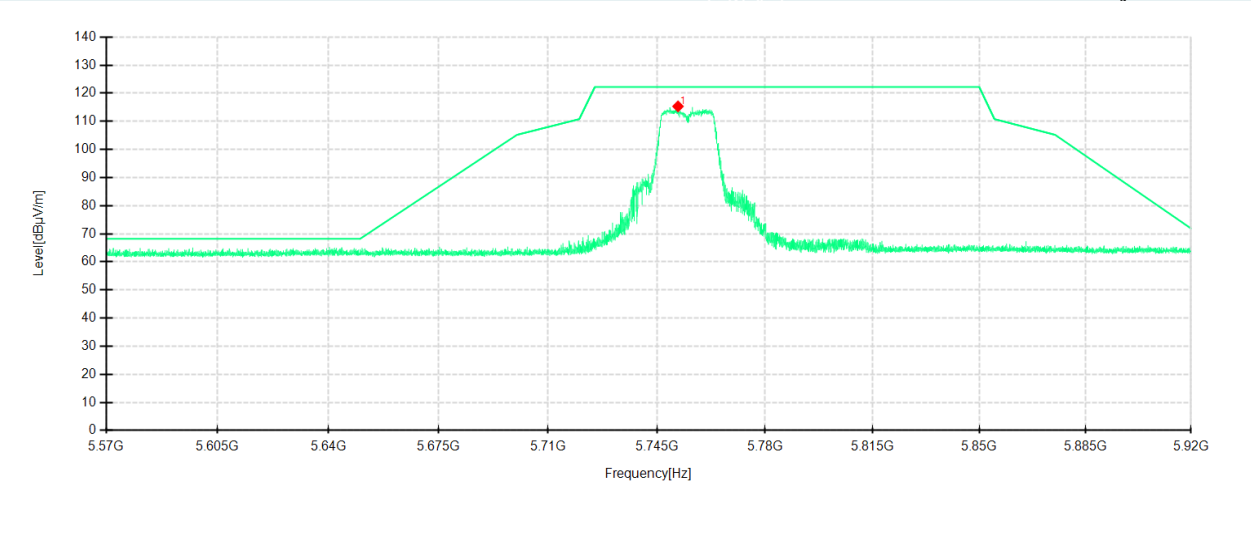


No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Comment
1	5043.0250	31.99	46.97	14.98	54.00	7.03	100	338	Horizontal	/
2	5150.0000	31.16	46.16	15.00	54.00	7.84	100	266	Horizontal	/
3	5223.6250	87.42	103.06	15.64	-	-	100	136	Horizontal	No limit
1	5052.3000	31.98	47.06	15.08	54.00	6.94	100	136	Vertical	/
2	5150.0000	31.02	45.82	14.80	54.00	8.18	100	22	Vertical	/
3	5222.7063	83.54	98.83	15.29	-	-	100	79	Vertical	No limit

IEEE 802.11ac VHT40 mode ANT4
Highest Channel

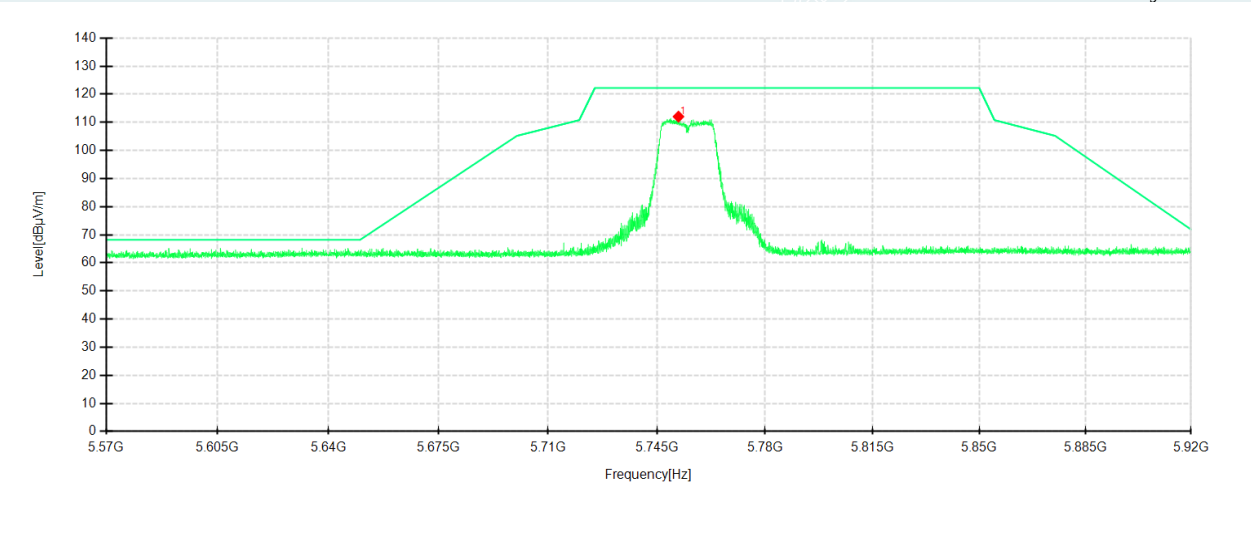
Frequency 5755MHz
Environment: 23.5°C/47%RH 101.0kPa
Tested By: Zhang Zishan
Detector mode: Peak

Voltage: AC 120V/60Hz
Date: 2023-11-25
Polarity: Horizontal



Detector mode: Peak

Polarity: Vertical

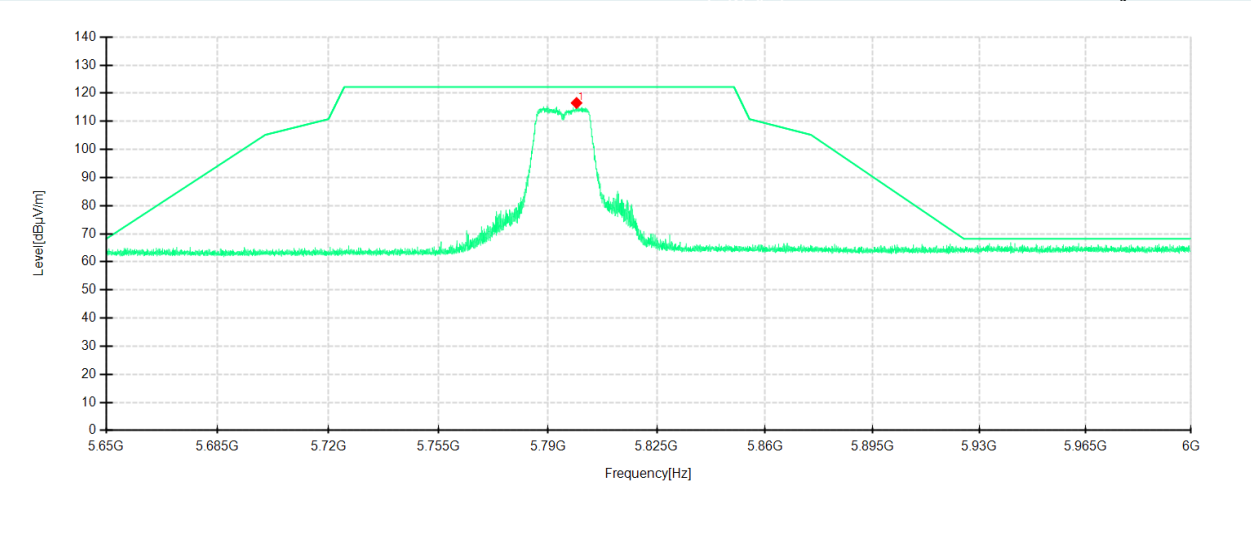


No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBμV/m	Margin dB	Height cm	Angle °	Pole	Comment
1	5751.8250	95.45	115.33	19.88	122.20	6.87	200	124	Horizontal	/
1	5751.9650	92.36	112.04	19.68	122.20	10.16	100	244	Vertical	/

IEEE 802.11ac VHT40 mode ANT4
Highest Channel

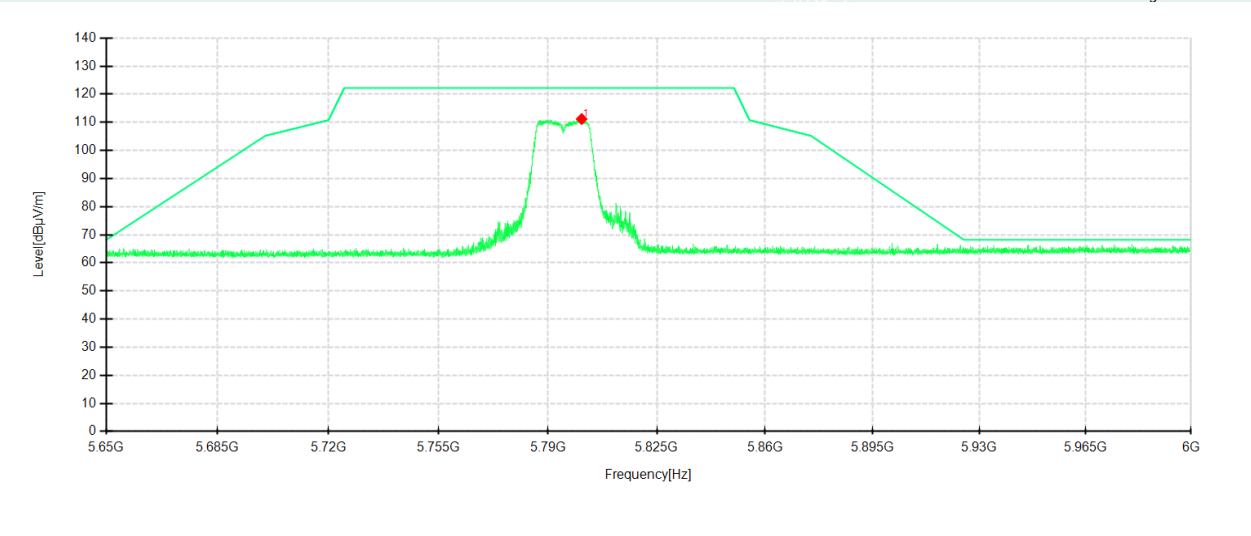
Frequency 5795MHz
Environment: 23.5°C/47%RH 101.0kPa
Tested By: Zhang Zishan
Detector mode: Peak

Voltage: AC 120V/60Hz
Date: 2023-11-25
Polarity: Horizontal



Detector mode: Peak

Polarity: Vertical



No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Comment
1	5799.1700	95.87	116.55	20.68	122.20	5.65	200	125	Horizontal	/
1	5800.8150	90.89	111.19	20.30	122.20	11.01	200	174	Vertical	/

IEEE 802.11ac VHT80 mode ANT4**Highest Channel**

Frequency 5210MHz

Environment: 23.5°C/47%RH 101.0kPa

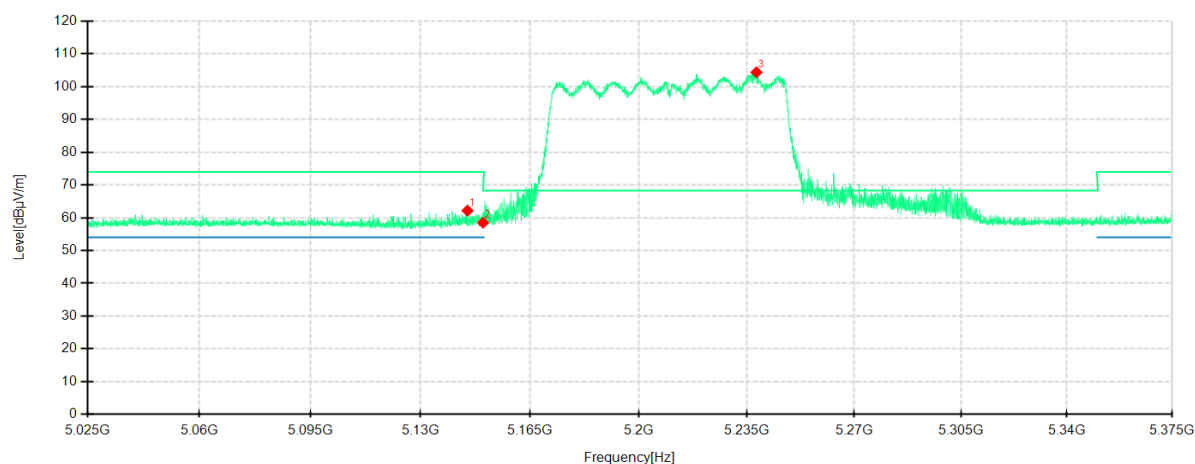
Tested By: Zhang Zishan

Detector mode: Peak

Voltage: AC 120V/60Hz

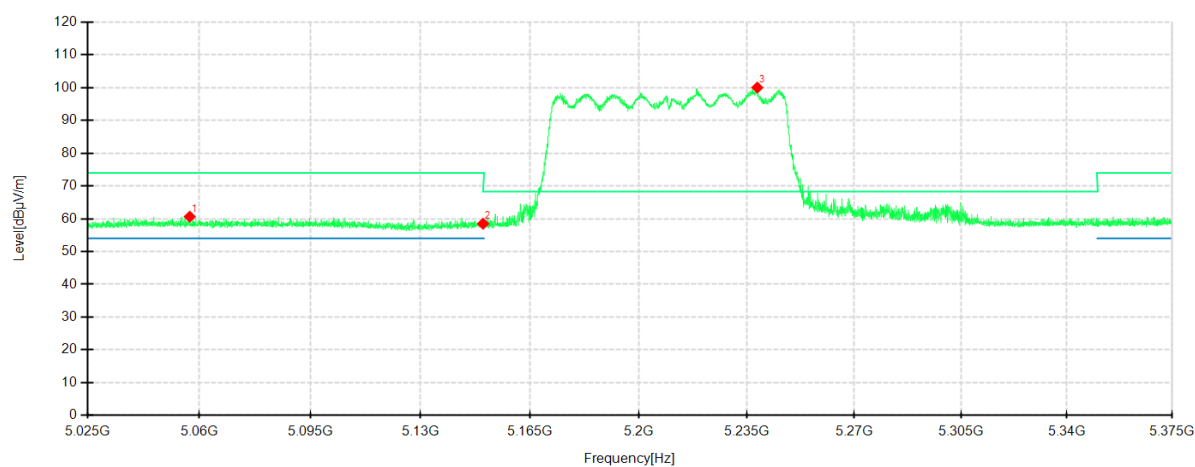
Date: 2023-11-25

Polarity: Horizontal



Detector mode: Peak

Polarity: Vertical

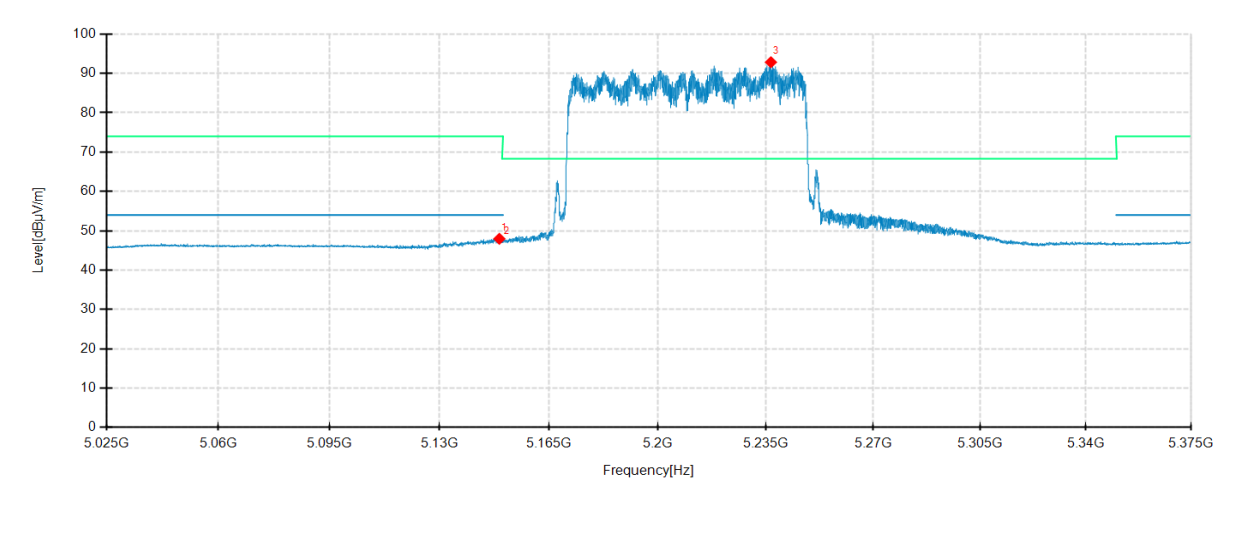


No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Comment
1	5145.0063	47.14	62.17	15.03	74.00	11.83	200	122	Horizontal	/
2	5150.0000	43.50	58.50	15.00	68.30	9.80	200	122	Horizontal	/
3	5238.1500	88.61	104.37	15.76	68.30	-36.07	200	122	Horizontal	No limit
1	5057.0688	45.53	60.64	15.11	74.00	13.36	200	33	Vertical	/
2	5150.0000	43.68	58.48	14.80	68.30	9.82	100	22	Vertical	/
3	5238.4125	84.63	100.02	15.39	68.30	-31.72	200	340	Vertical	No limit

IEEE 802.11ac VHT80 mode ANT4
Highest Channel

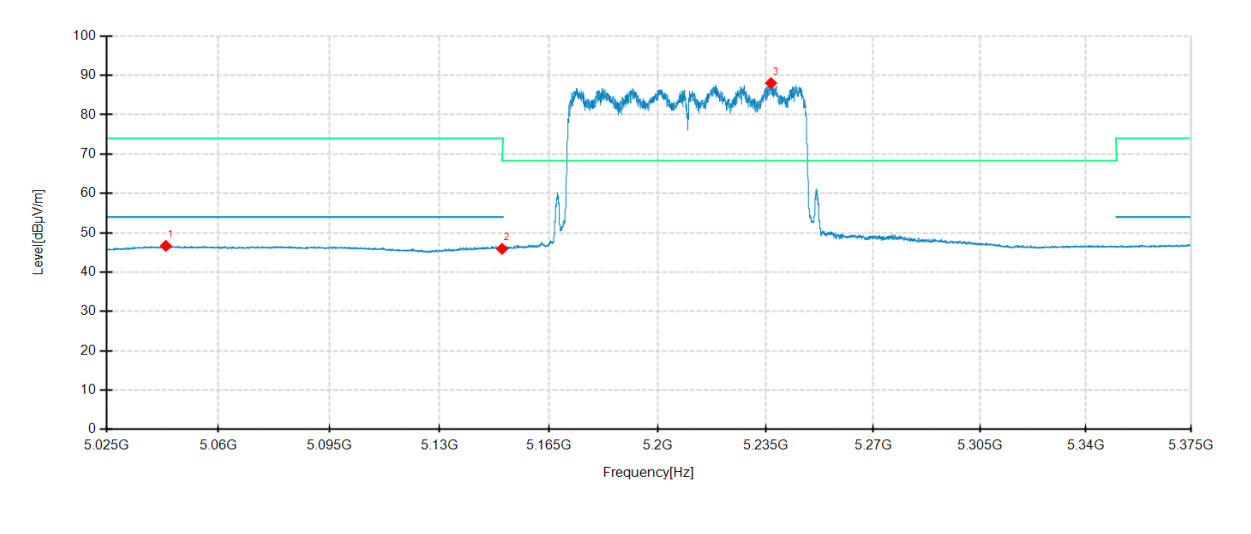
Frequency 5210MHz
Environment: 23.5°C/47%RH 101.0kPa
Tested By: Zhang Zishan
Detector mode: Average

Voltage: AC 120V/60Hz
Date: 2023-11-25
Polarity: Horizontal



Detector mode: Average

Polarity: Vertical



No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Comment
1	5149.1188	32.96	47.96	15.00	54.00	6.04	200	119	Horizontal	/
2	5150.0000	32.16	47.16	15.00	54.00	6.84	100	180	Horizontal	/
3	5236.6625	77.08	92.84	15.76	-	-	200	119	Horizontal	No limit
1	5043.6375	31.63	46.66	15.03	54.00	7.34	100	49	Vertical	/
2	5150.0000	31.12	45.92	14.80	54.00	8.08	100	250	Vertical	/
3	5236.7063	72.67	88.05	15.38	-	-	200	4	Vertical	No limit

IEEE 802.11ac VHT80 mode ANT4

Highest Channel

Frequency 5775MHz

Environment: 23.5°C/47%RH 101.0kPa

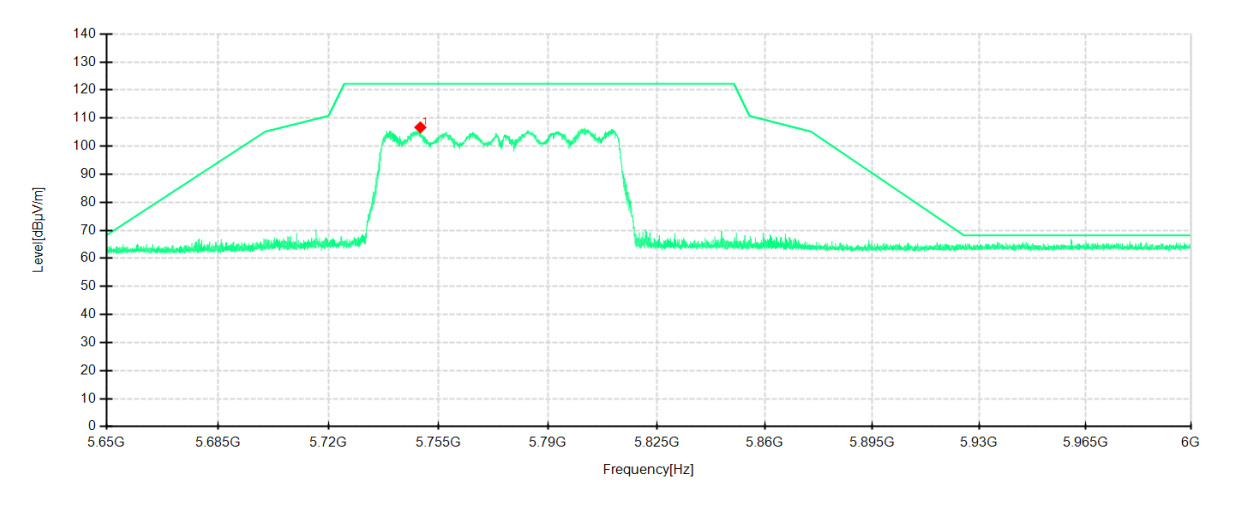
Tested By: Zhang Zishan

Detector mode: Peak

Voltage: AC 120V/60Hz

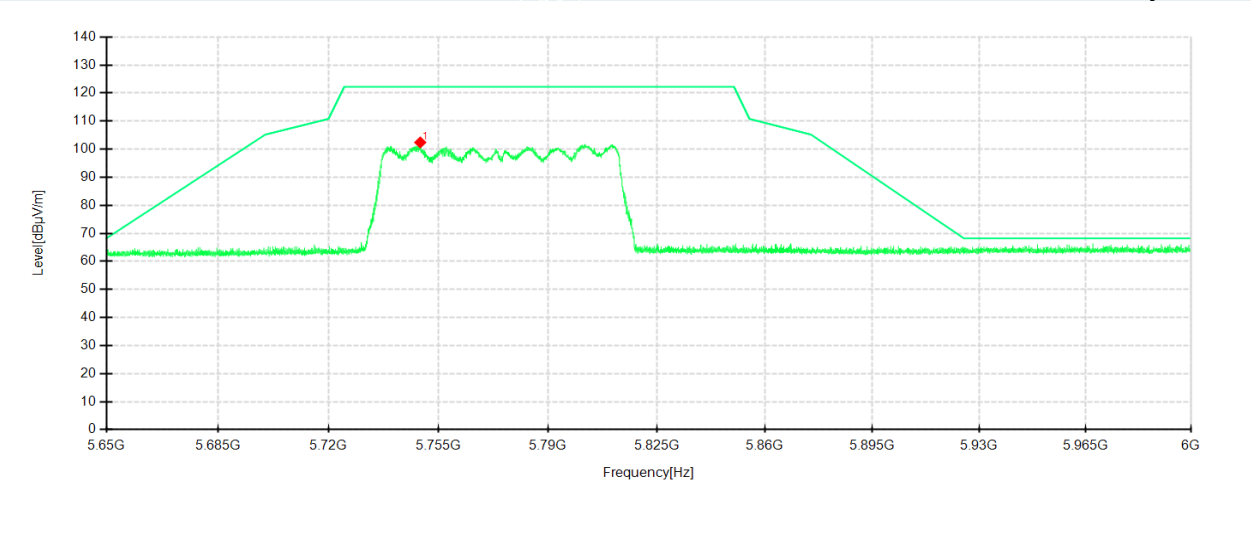
Date: 2023-11-25

Polarity: Horizontal



Detector mode: Peak

Polarity: Vertical



No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Comment
1	5749.1900	86.87	106.72	19.85	122.20	15.48	200	124	Horizontal	/
1	5749.1550	82.76	102.41	19.65	122.20	19.79	100	247	Vertical	/

8. 6dB BANDWIDTH & 26dB BANDWIDTH & 99% OCCUPIED BANDWIDTH

8.1 LIMITS

Band	Frequency (MHz)	Test Item	Limit
U-NII-1	5150-5250	26dB Bandwidth&99% Occupied Bandwidth	N/A
U-NII-2A	5250-5350	26dB Bandwidth&99% Occupied Bandwidth	N/A
U-NII-2C	5470-5725	26dB Bandwidth&99% Occupied Bandwidth	N/A
U-NII-3	5725-5850	6dB Bandwidth&99% Occupied Bandwidth	6dB Bandwidth $\geq$ 500kHz

8.2 TEST PROCEDURES

For 26dB Bandwidth Measurement :

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with table 1.
- Set the EUT transmit continuously with maximum output power.
- Allow trace to stabilize, 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 instrument. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
- Repeat above procedures until all modes and channels were measured.
- Record the results in the test report.

For 6dB Bandwidth Measurement :

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with table 2.
- Set the EUT transmit continuously with maximum output power.
- Allow trace to stabilize, measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
- Repeat above procedures until all modes and channels were measured.
- Record the results in the test report.

For 99% Occupied Bandwidth Measurement :

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with table 3.
- Set the EUT transmit continuously with maximum output power.
- Allow trace to stabilize, use the 99% power bandwidth function to measure bandwidth.
- Repeat above procedures until all modes and channels were measured.

Record the results in the test report.

Table 1:

26dB Bandwidth	
Spectrum Parameters	Setting
RBW	approximately 1% of the emission bandwidth
VBW	> RBW
Span	40MHz(20MHz Bandwidth mode) 60MHz(40MHz Bandwidth mode) 120MHz(80MHz Bandwidth mode)
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

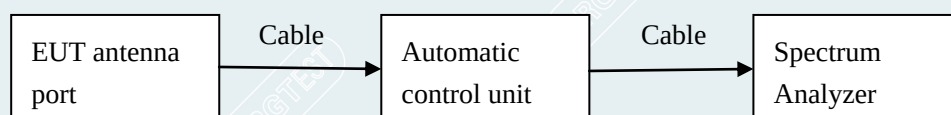
Table 2:

6dB Bandwidth	
Spectrum Parameters	Setting
RBW	100kHz
VBW	300kHz
Span	40MHz(20MHz Bandwidth mode) 60MHz(40MHz Bandwidth mode) 120MHz(80MHz Bandwidth mode)
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

Table 3:

99% Occupied Bandwidth	
Spectrum Parameters	Setting
RBW	1% to 5% of the OBW
VBW	approximately three times the RBW
Span	between 1.5 times and 5.0 times the OBW
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

8.3 TEST SETUP



8.4 TEST RESULTS

Environment: 26.9°C/67%RH 101.0kPa
Tested By: Huang Tianmei

Voltage:DC 5V
Date: 2023-11-21

6dB Bandwidth

TestMode	Antenna	Freq(MHz)	6dB EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
IEEE 802.11a	Ant4	5745	16.32	5736.84	5753.16	0.5	PASS
		5785	16.32	5776.84	5793.16	0.5	PASS
		5825	16.32	5816.84	5833.16	0.5	PASS
IEEE 802.11n HT20	Ant4	5745	17.04	5736.48	5753.52	0.5	PASS
		5785	17.56	5776.20	5793.76	0.5	PASS
		5825	17.56	5816.20	5833.76	0.5	PASS
IEEE 802.11n HT40	Ant4	5755	35.68	5737.08	5772.76	0.5	PASS
		5795	35.20	5777.40	5812.60	0.5	PASS
IEEE 802.11ac VHT20	Ant4	5745	17.28	5736.48	5753.76	0.5	PASS
		5785	17.08	5776.44	5793.52	0.5	PASS
		5825	17.52	5816.24	5833.76	0.5	PASS
IEEE 802.11ac VHT40	Ant4	5755	35.20	5737.40	5772.60	0.5	PASS
		5795	35.36	5777.40	5812.76	0.5	PASS
IEEE 802.11ac VHT80	Ant4	5775	75.20	5737.40	5812.60	0.5	PASS

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26dB Bandwidth

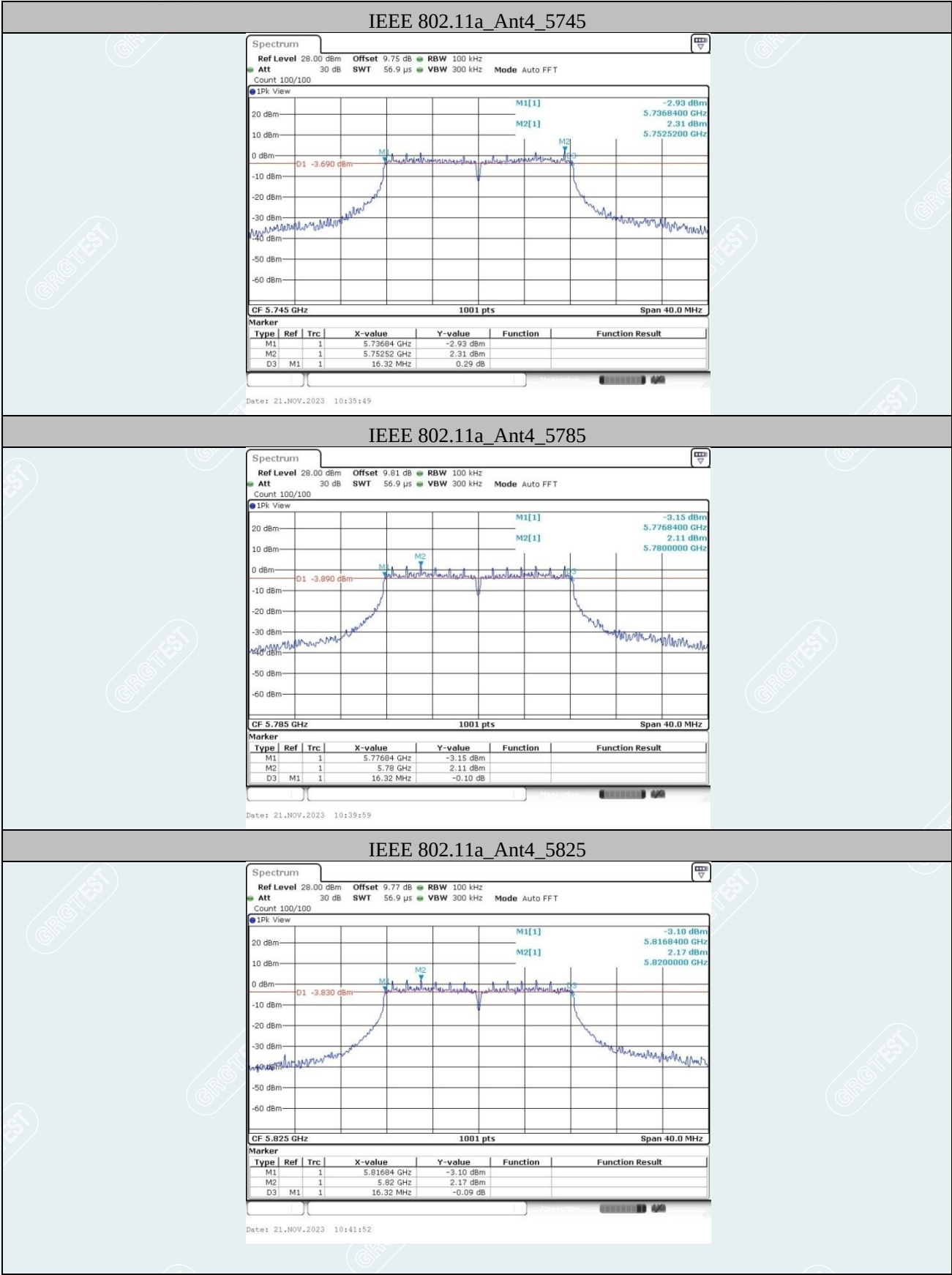
TestMode	Antenna	Freq(MHz)	26dB EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
IEEE 802.11a	Ant4	5180	20.56	5169.88	5190.44	---	---
		5200	20.36	5189.80	5210.16	---	---
		5240	21.24	5229.56	5250.80	---	---
IEEE 802.11n HT20	Ant4	5180	21.28	5169.40	5190.68	---	---
		5200	21.44	5189.28	5210.72	---	---
		5240	21.36	5229.36	5250.72	---	---
IEEE 802.11n HT40	Ant4	5190	42.40	5169.04	5211.44	---	---
		5230	42.88	5208.72	5251.60	---	---
IEEE 802.11ac VHT20	Ant4	5180	21.08	5169.48	5190.56	---	---
		5200	21.32	5189.32	5210.64	---	---
		5240	21.44	5229.36	5250.80	---	---
IEEE 802.11ac VHT40	Ant4	5190	42.64	5168.72	5211.36	---	---
		5230	42.48	5208.96	5251.44	---	---
IEEE 802.11ac VHT80	Ant4	5210	81.12	5169.84	5250.96	---	---

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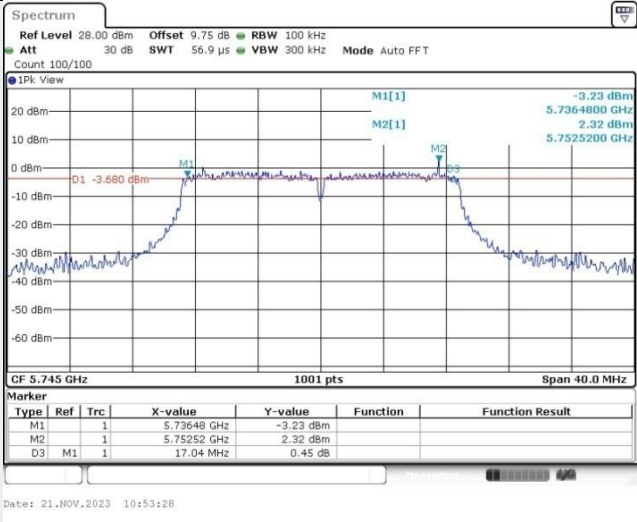
99% OCCUPIED BANDWIDTH

TestMode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
IEEE 802.11a	Ant4	5180	17.303	5171.4486	5188.7512	---	---
		5200	17.303	5191.3287	5208.6314	---	---
		5240	17.303	5231.4885	5248.7912	---	---
		5745	17.423	5736.2488	5753.6713	---	---
		5785	17.423	5776.1289	5793.5514	---	---
		5825	17.343	5816.2488	5833.5914	---	---
IEEE 802.11n HT20	Ant4	5180	18.262	5170.8891	5189.1508	---	---
		5200	18.062	5191.0090	5209.0709	---	---
		5240	18.142	5231.0490	5249.1908	---	---
		5745	18.462	5735.6893	5754.1508	---	---
		5785	18.142	5775.9690	5794.1109	---	---
		5825	18.022	5815.9690	5833.9910	---	---
IEEE 802.11n HT40	Ant4	5190	36.523	5171.6184	5208.1419	---	---
		5230	36.364	5211.7782	5248.1419	---	---
		5755	37.083	5736.1389	5773.2218	---	---
		5795	36.843	5776.6184	5813.4615	---	---
IEEE 802.11ac VHT20	Ant4	5180	18.222	5170.8891	5189.1109	---	---
		5200	18.222	5190.8092	5209.0310	---	---
		5240	18.102	5230.9291	5249.0310	---	---
		5745	18.302	5735.8092	5754.1109	---	---
		5785	18.302	5775.9291	5794.2308	---	---
		5825	18.062	5816.0090	5834.0709	---	---
IEEE 802.11ac VHT40	Ant4	5190	36.683	5171.6184	5208.3017	---	---
		5230	36.444	5211.8581	5248.3017	---	---
		5755	36.523	5736.6983	5773.2218	---	---
		5795	36.763	5776.5385	5813.3017	---	---
IEEE 802.11ac VHT80	Ant4	5210	76.404	5171.7982	5248.2018	---	---
		5775	76.244	5736.7982	5813.0420	---	---

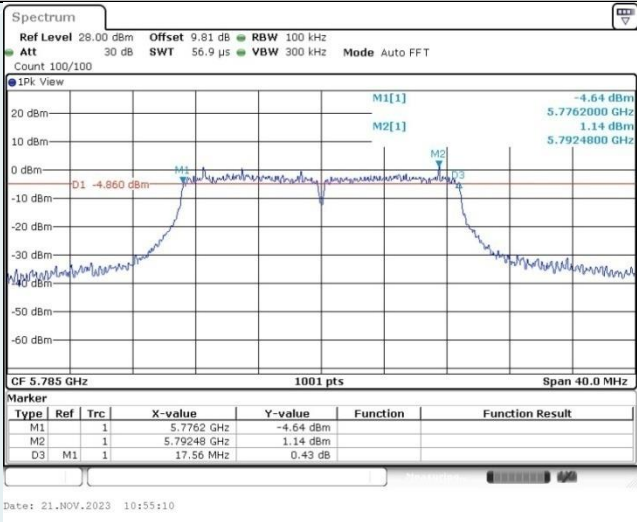
Test Graphs
6dB Bandwidth



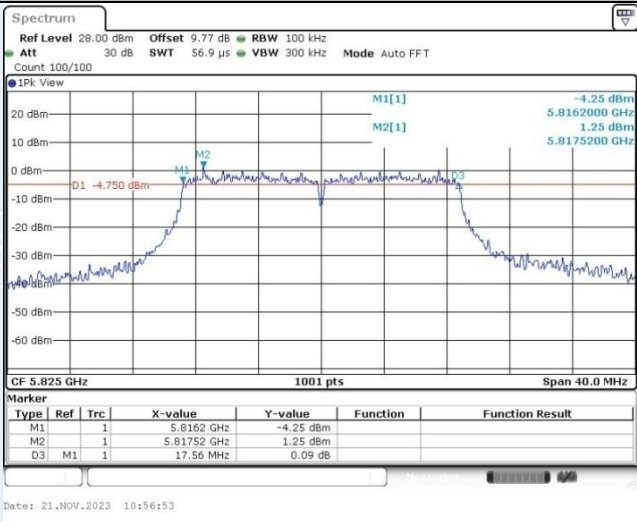
IEEE 802.11n HT20_Ant4_5745



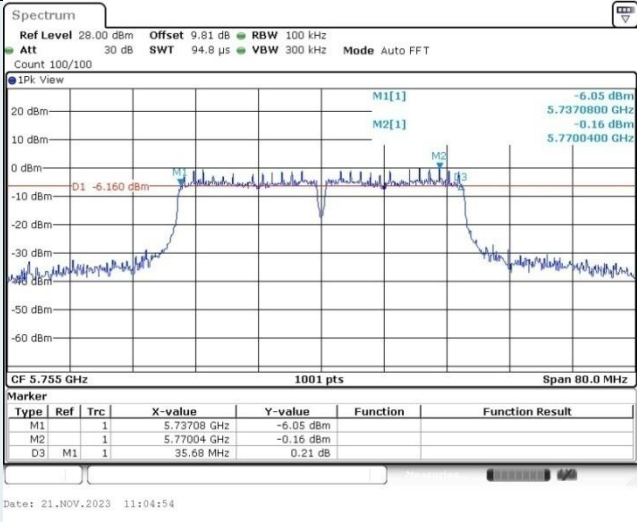
IEEE 802.11n HT20_Ant4_5785



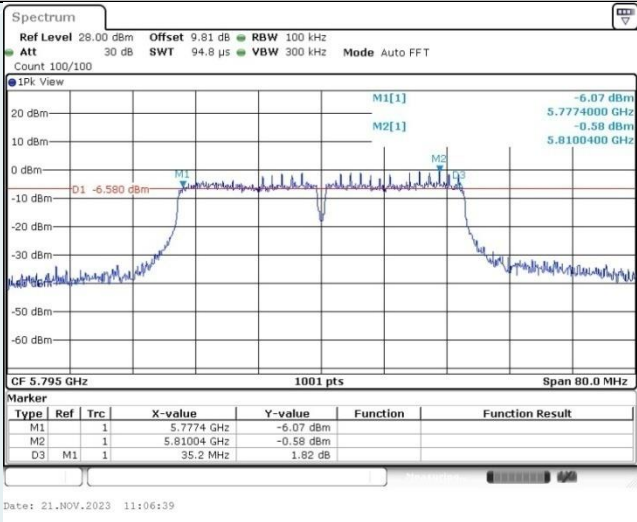
IEEE 802.11n HT20_Ant4_5825



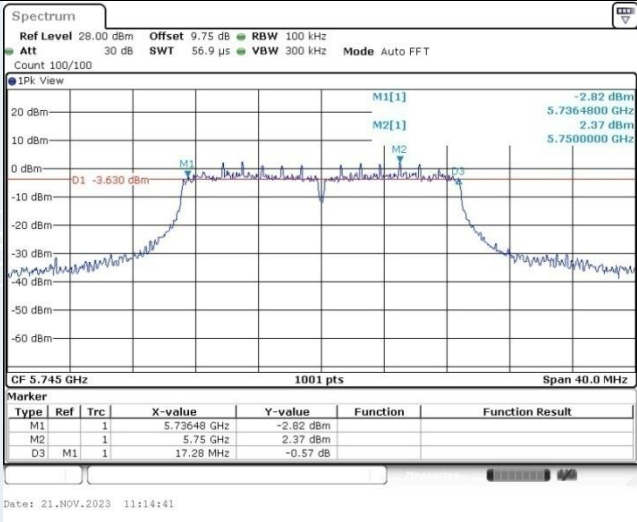
IEEE 802.11n HT40_Ant4_5755



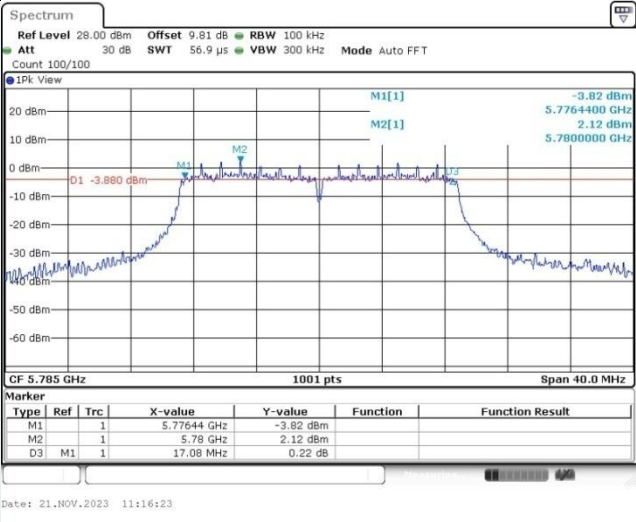
IEEE 802.11n HT40_Ant4_5795



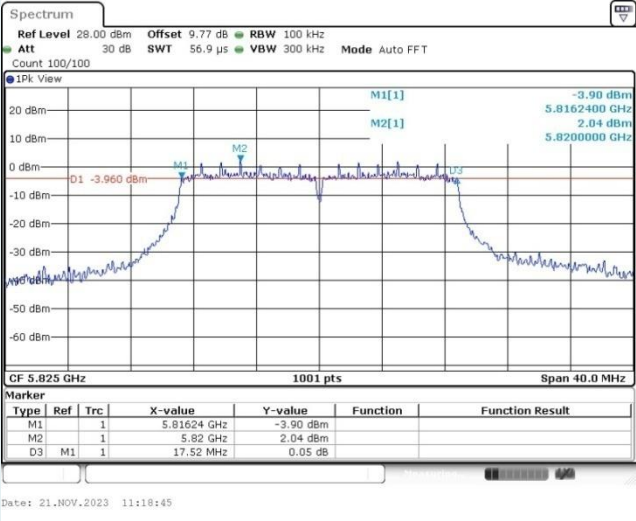
IEEE 802.11ac VHT20_Ant4_5745



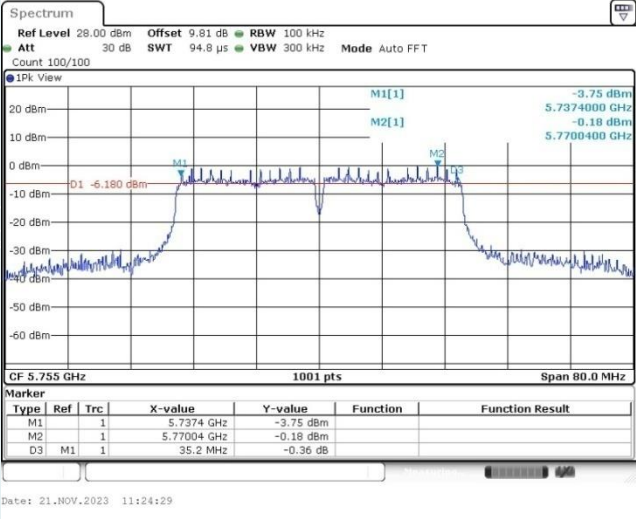
IEEE 802.11ac VHT20_Ant4_5785



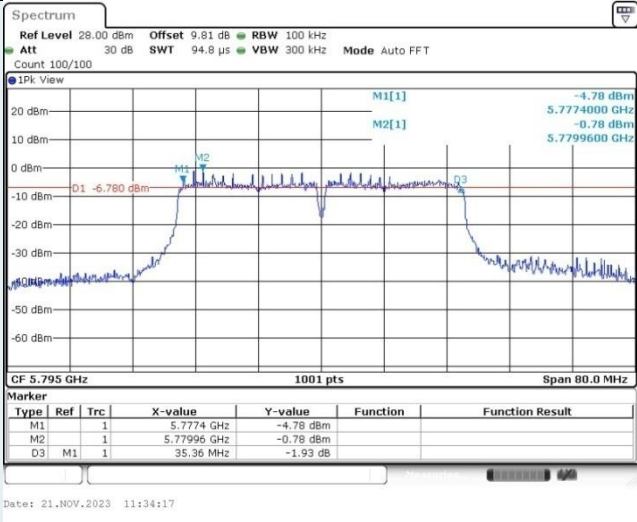
IEEE 802.11ac VHT20_Ant4_5825



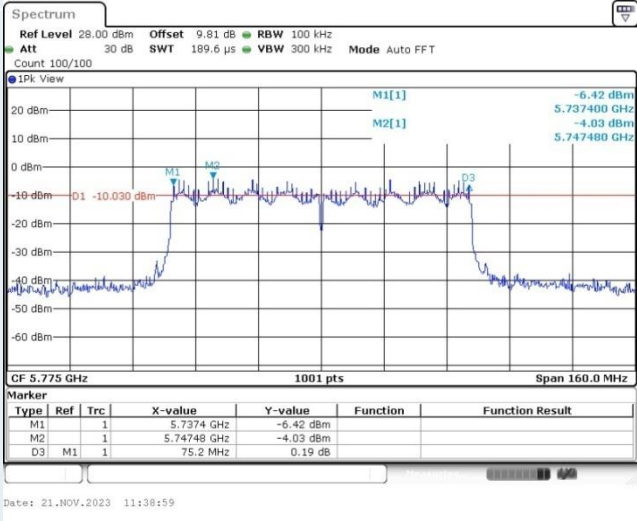
IEEE 802.11ac VHT40_Ant4_5755



IEEE 802.11ac VHT40_Ant4_5795



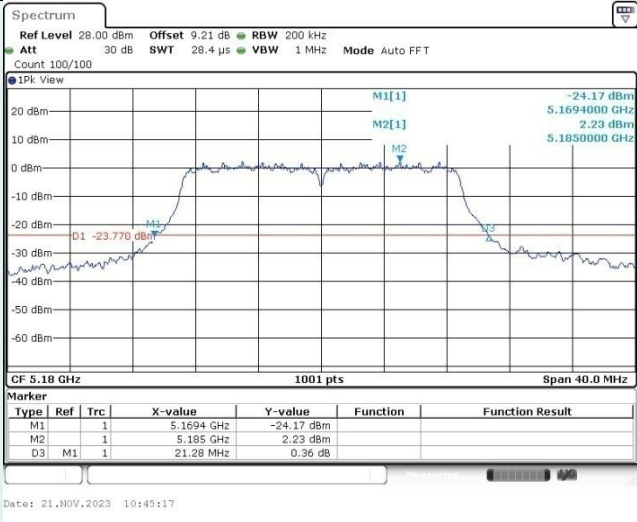
IEEE 802.11ac VHT80_Ant4_5775



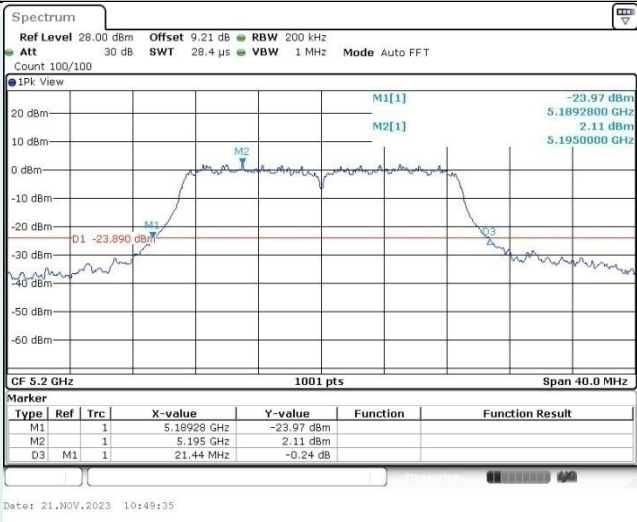
26dB Bandwidth



IEEE 802.11n HT20_Ant4_5180



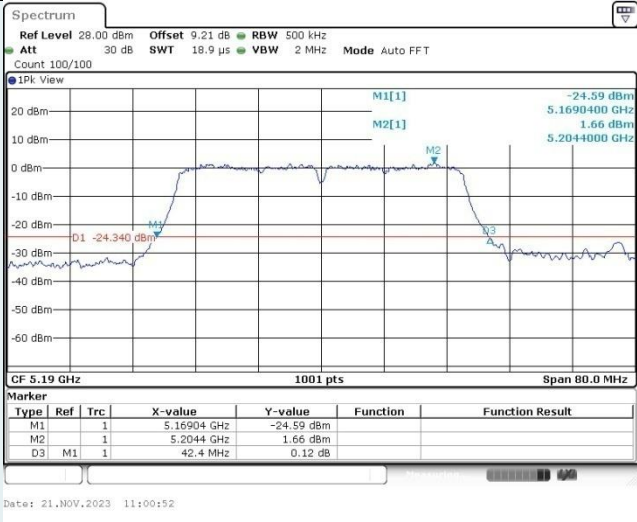
IEEE 802.11n HT20_Ant4_5200



IEEE 802.11n HT20_Ant4_5240



IEEE 802.11n HT40_Ant4_5190



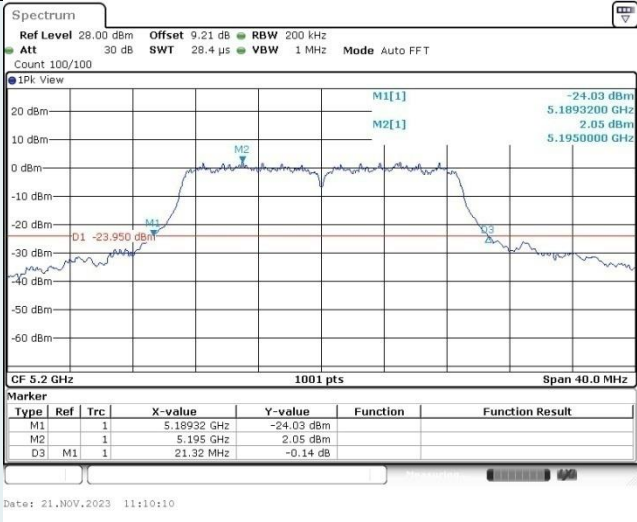
IEEE 802.11n HT40_Ant4_5230



IEEE 802.11ac VHT20_Ant4_5180



IEEE 802.11ac VHT20_Ant4_5200



IEEE 802.11ac VHT20_Ant4_5240

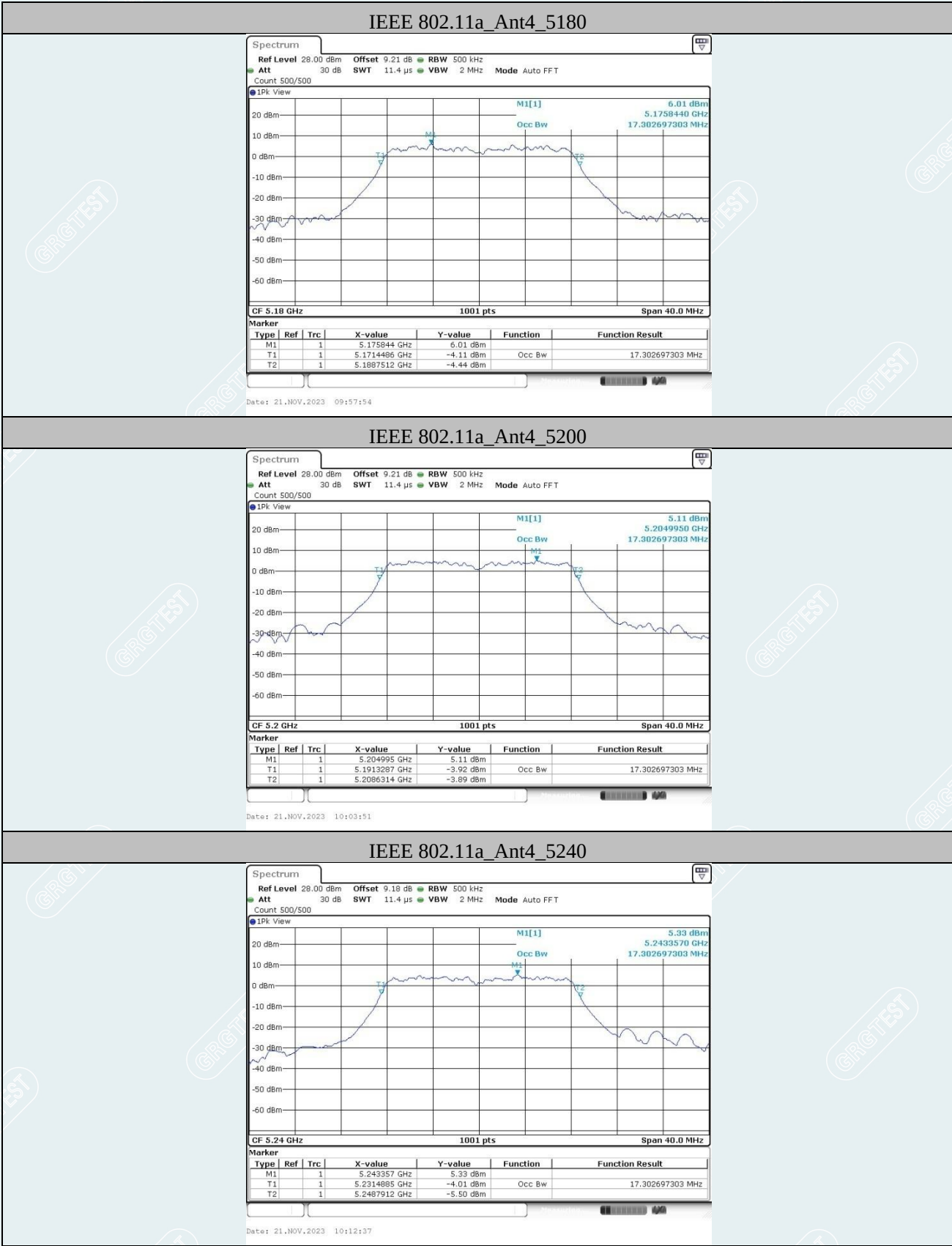


IEEE 802.11ac VHT40_Ant4_5190

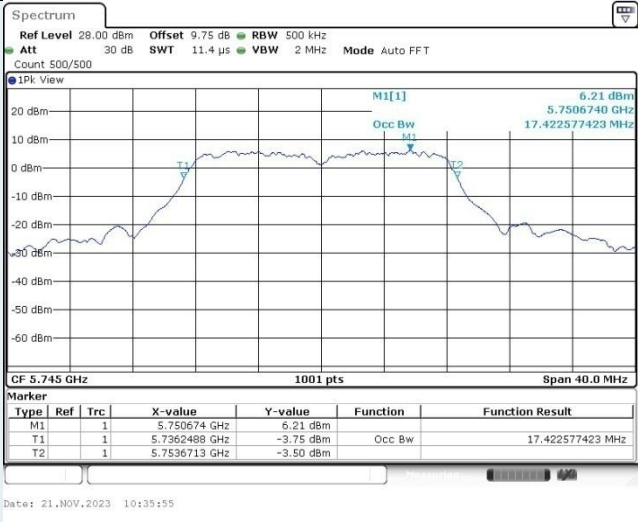




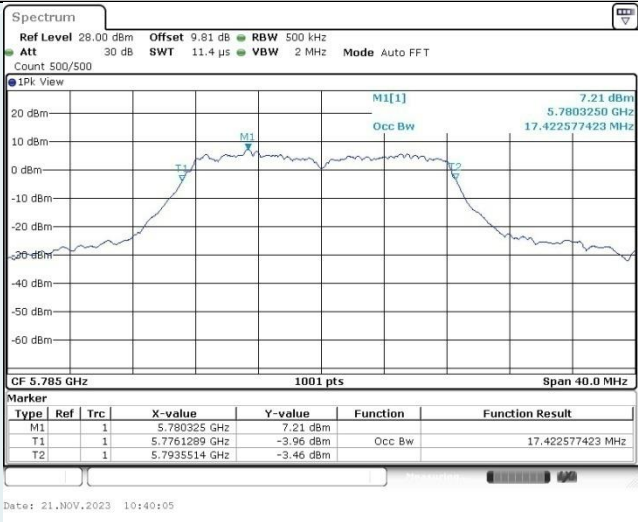
99% OCCUPIED BANDWIDTH



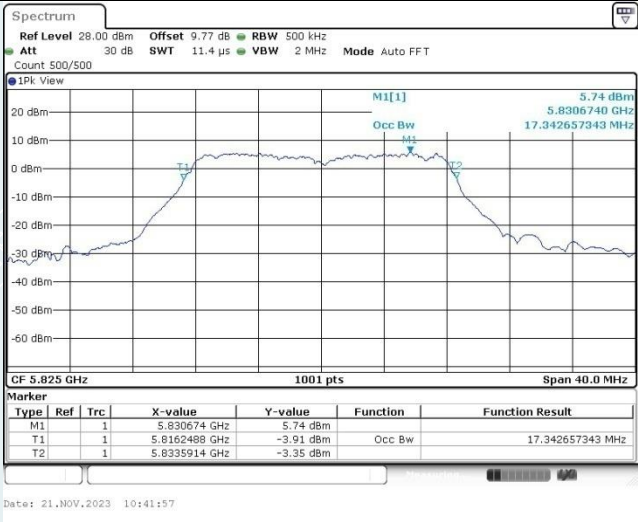
IEEE 802.11a_Ant4_5745



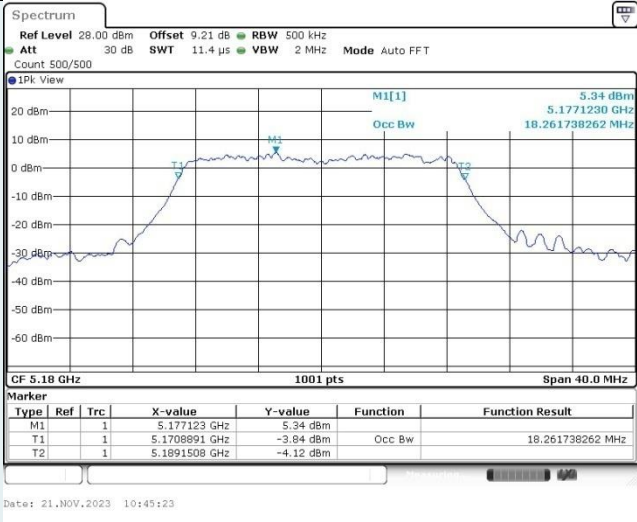
IEEE 802.11a_Ant4_5785



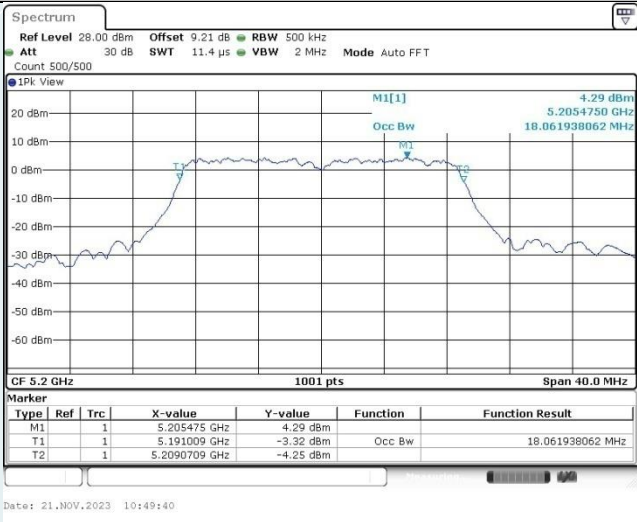
IEEE 802.11a_Ant4_5825



IEEE 802.11n HT20_Ant4_5180



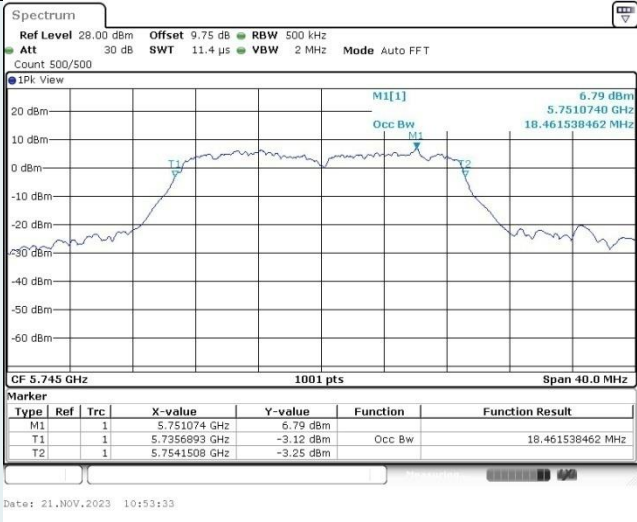
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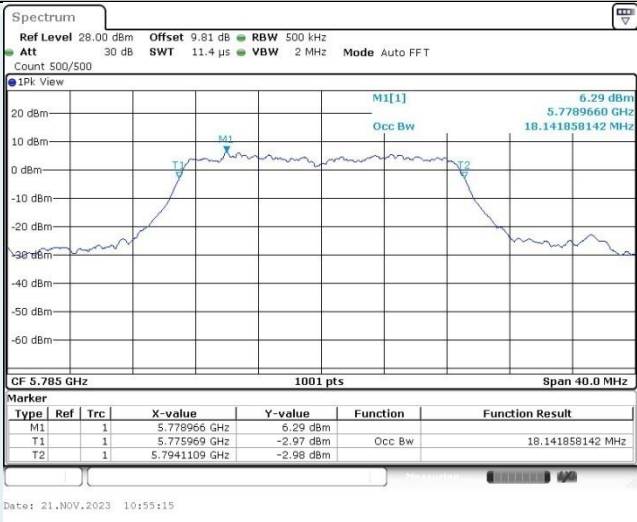
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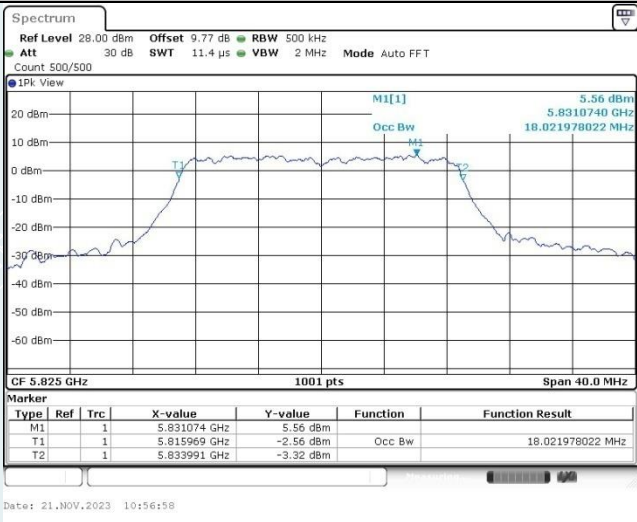
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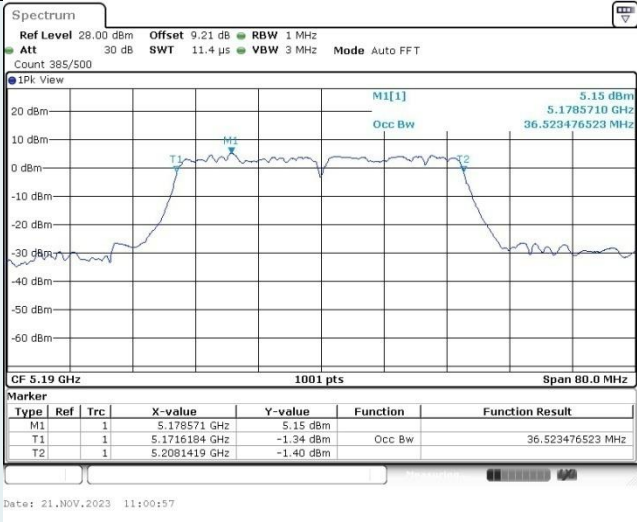
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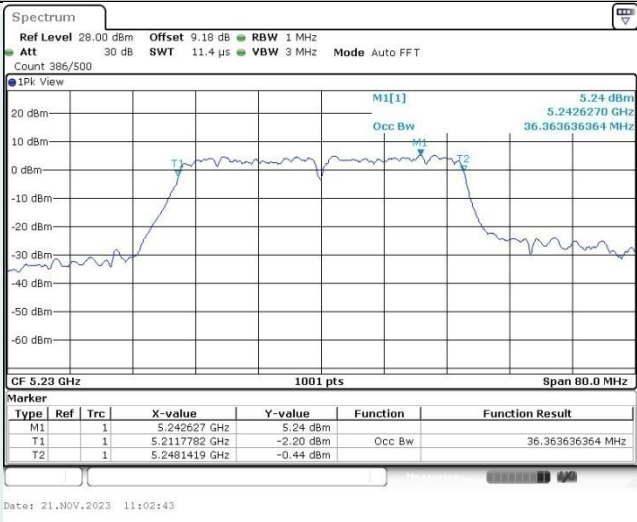
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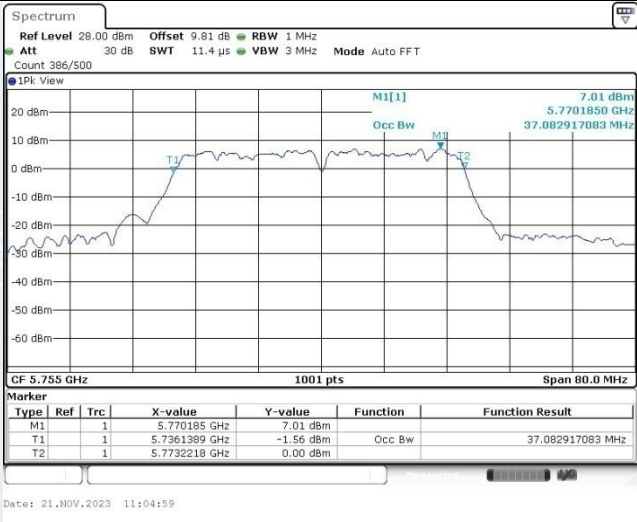
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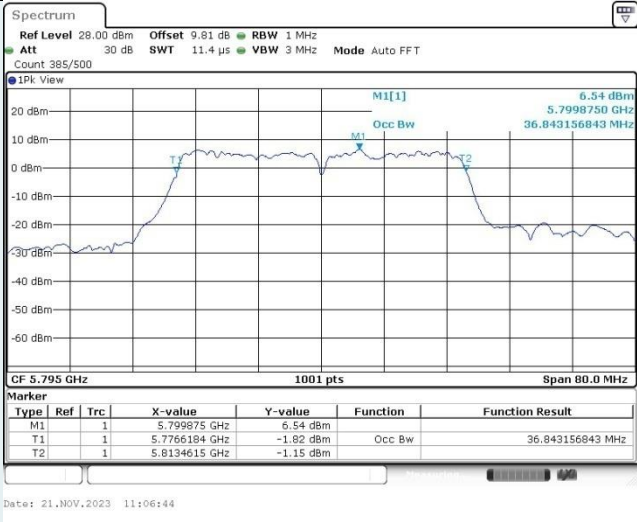
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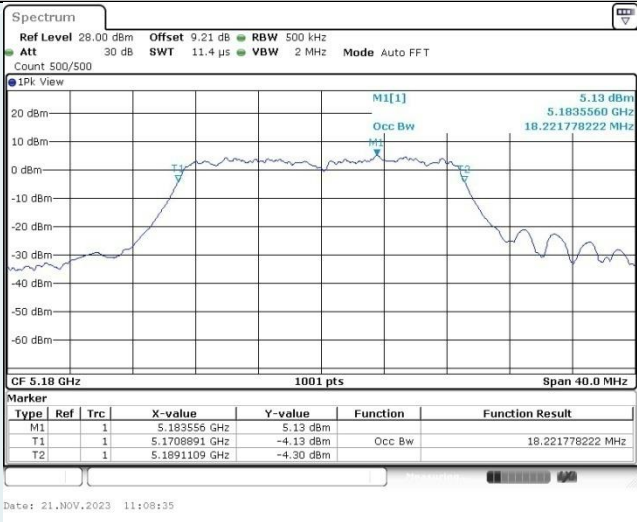
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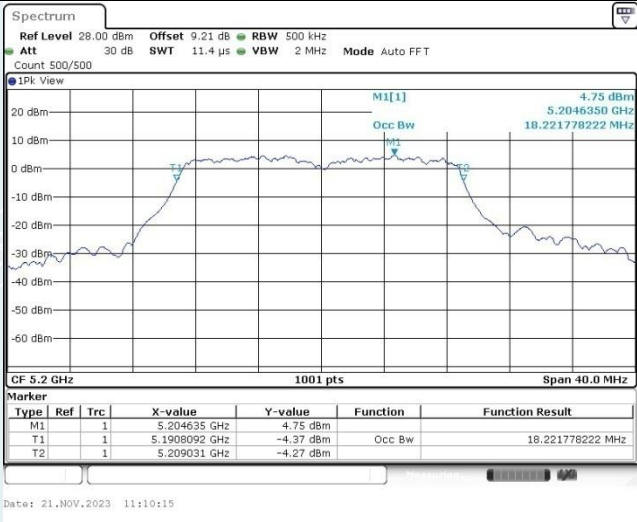
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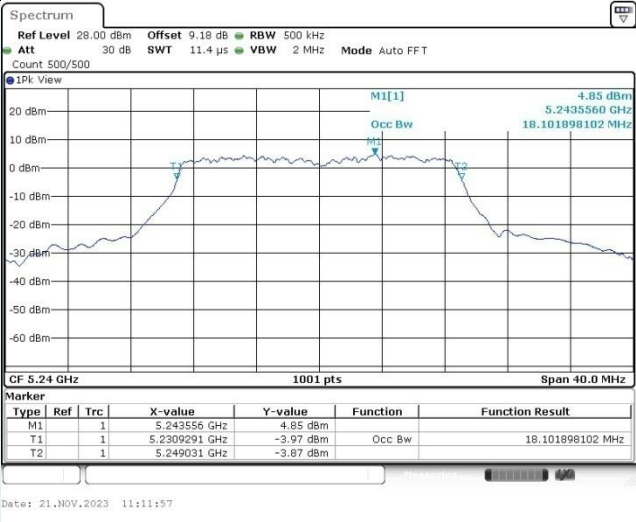
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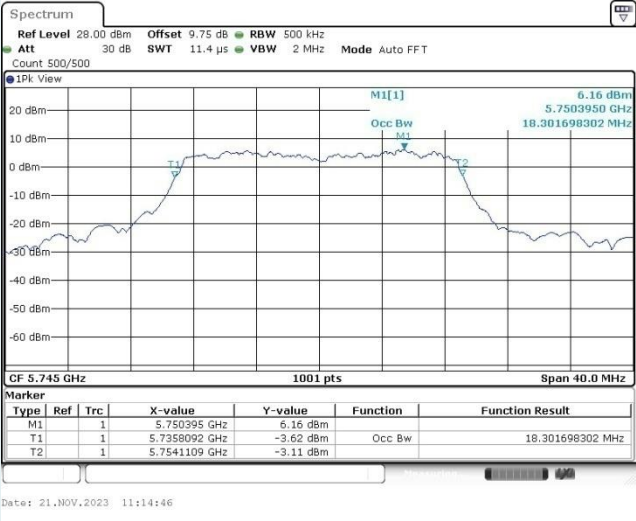
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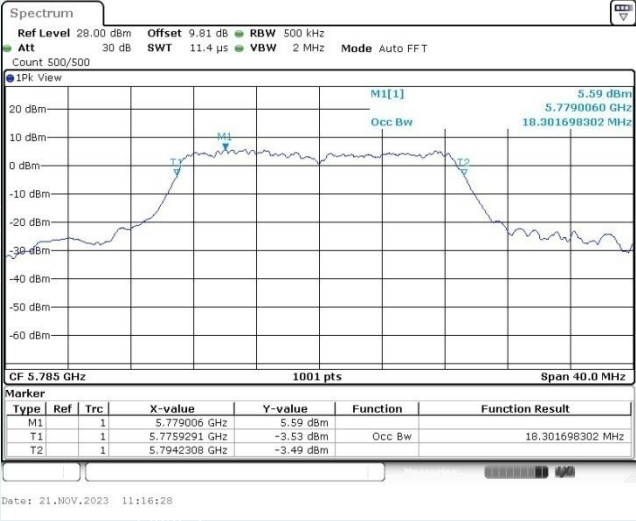
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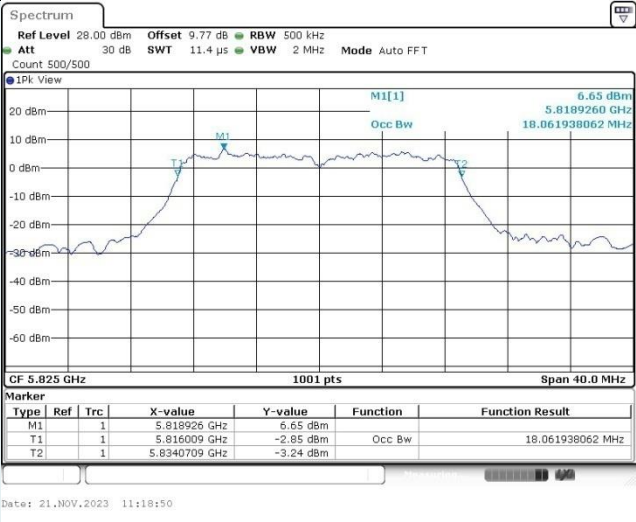
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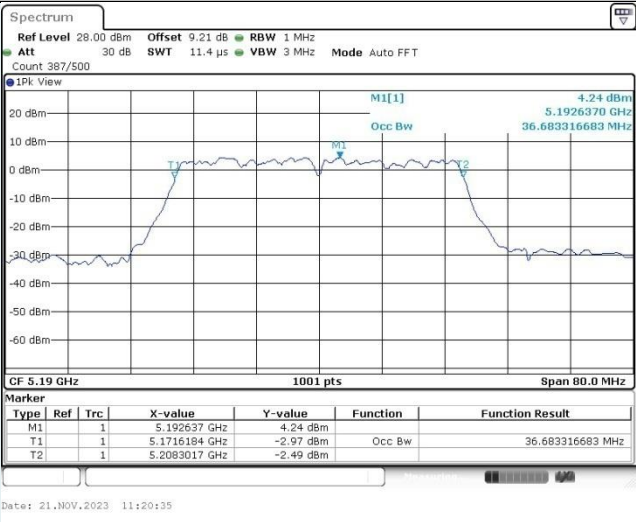
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IEEE 802.11ac VHT20_Ant4_5825



IEEE 802.11ac VHT40_Ant4_5190



IEEE 802.11ac VHT40_Ant4_5230

