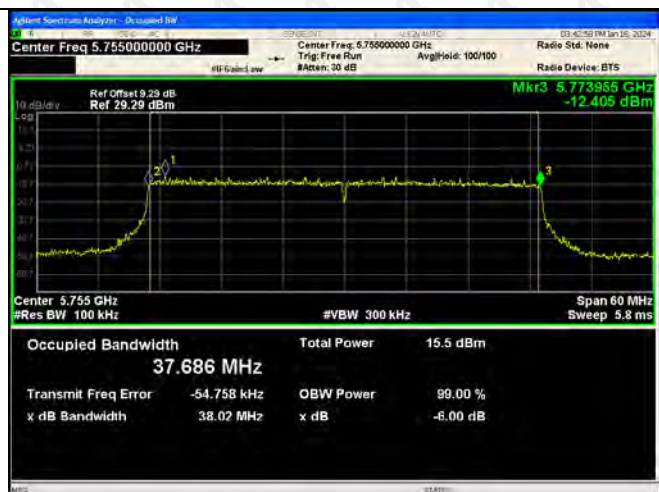
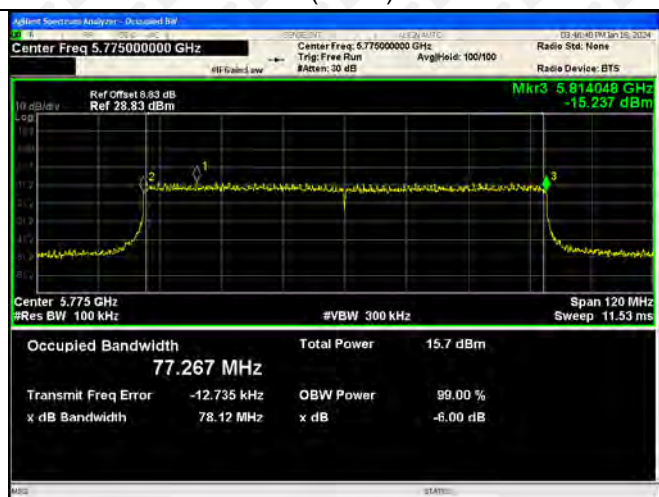




802.11ax(VH40)-5795

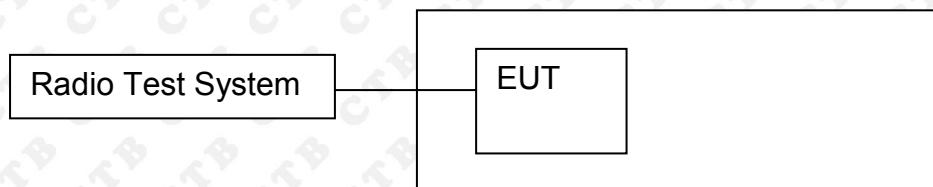


802.11ax(VH80)-5775



11. POWER SPECTRAL DENSITY

11.1 Block Diagram Of Test Setup



11.2 Limit

(1) For the band 5.15-5.25 GHz.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

11.3 Test procedure

According to KDB789033 D02v02r01 sectionE, the following is the measurement procedure.

For devices operating in the bands 5.15–5.25 GHz, 5.25–5.35 GHz, and 5.47–5.725 GHz, the preceding procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in Section 15.407(a)(5). For devices operating in the band 5.725–5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth ($< 1 \text{ MHz}$, or $< 500 \text{ kHz}$) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:

a) Set $\text{RBW} \geq 1/T$, where T is defined in II.B.I.a).

b) Set $\text{VBW} \geq 3 \text{ RBW}$.

c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10 \log (500 \text{ kHz}/\text{RBW})$ to the

measured result, whereas RBW (<500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add $10 \log (1\text{MHz}/\text{RBW})$ to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.

e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the II.F.5.c) and II.F.5.d), since RBW=100 kHz is available on nearly all spectrum analyzers.

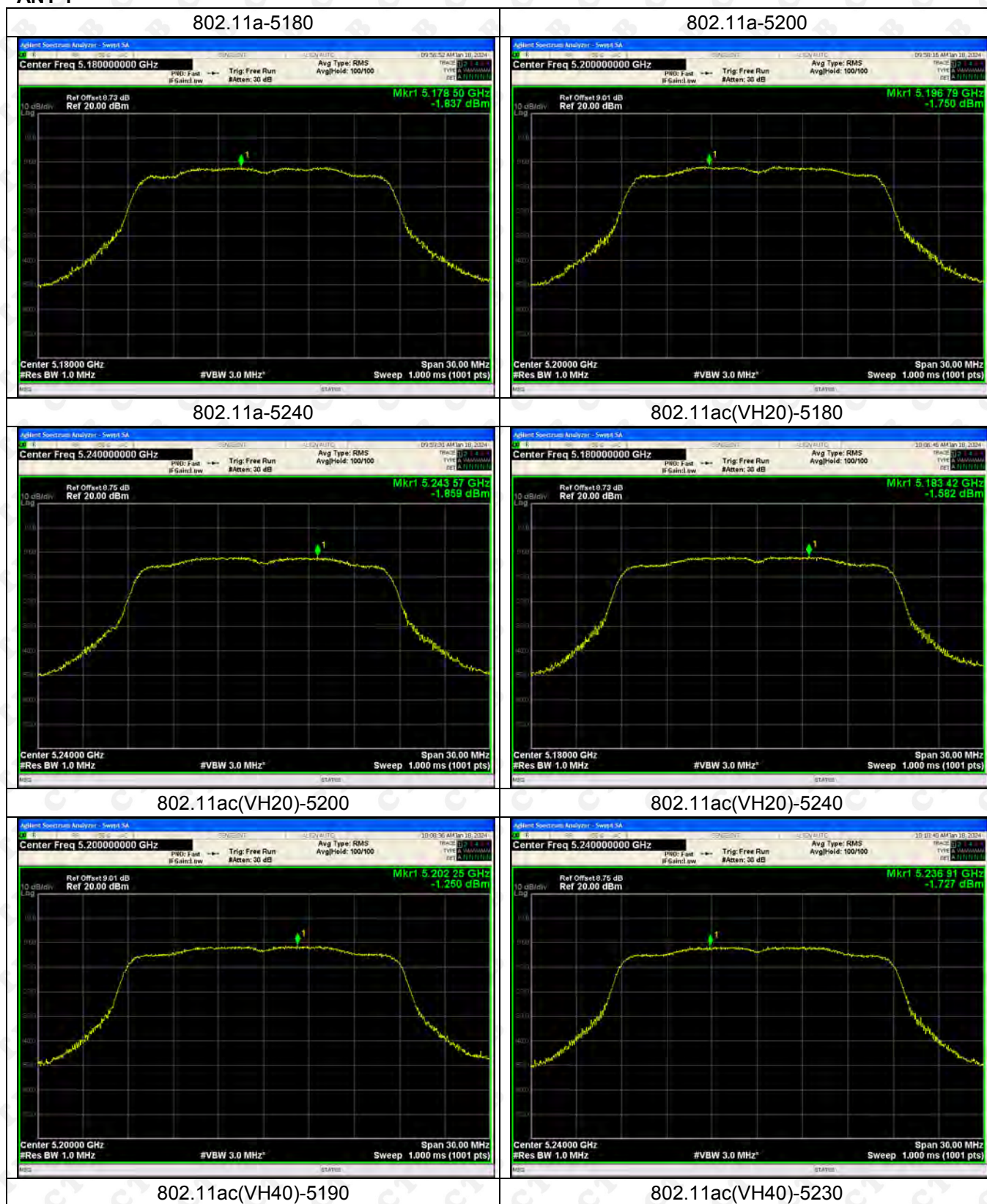
11.4 Test Result

ANT 1+ANT2

Test mode	Test Channel (MHz)	PSD [dBm/MHz] ANT 1	PSD [dBm/MHz] ANT 2	PSD [dBm/MHz] Total	Limit (dBm/MHz)	Result
802.11a	5180	-1.837	-2.439	/	11	Pass
	5200	-1.75	-2.512	/	11	Pass
	5240	-1.859	-2.519	/	11	Pass
802.11ac(VH20)	5180	-1.582	-2.403	1.037	11	Pass
	5200	-1.25	-2.368	1.237	11	Pass
	5240	-1.727	-2.539	0.896	11	Pass
802.11ac(VH40)	5190	-5.522	-6.349	-2.906	11	Pass
	5230	-5.462	-6.642	-3.002	11	Pass
802.11n(VH20)	5180	-1.687	-2.476	0.947	11	Pass
	5200	-1.411	-2.332	1.163	11	Pass
	5240	-1.618	-2.814	0.835	11	Pass
802.11n(VH40)	5190	-4.86	-5.644	-2.224	11	Pass
	5230	-4.672	-6.058	-2.300	11	Pass
802.11ac(VH80)	5230	-8.578	-8.989	-5.768	11	Pass
802.11ax(VH20)	5180	-2.885	-3.377	-0.114	11	Pass
	5200	-2.567	-3.03	0.218	11	Pass
	5240	-2.886	-3.257	-0.057	11	Pass
802.11ax(VH40)	5190	-5.68	-5.973	-2.814	11	Pass
	5230	-5.518	-6.009	-2.746	11	Pass
802.11ax(VH80)	5210	-8.665	-8.949	-5.794	11	Pass

Test mode	Test Channel (MHz)	PSD [dBm/MHz] ANT 1	PSD [dBm/MHz] ANT 2	PSD [dBm/MHz] Total	Limit (dBm)	Result
802.11a	5745	-6.742	-6.593	/	30	Pass
	5785	-7.298	-6.758	/	30	Pass
	5825	-6.051	-5.546	/	30	Pass
802.11ac(VH20)	5745	-7.398	-6.516	-3.924	30	Pass
	5785	-7.689	-6.389	-3.980	30	Pass
	5825	-6.535	-5.426	-2.935	30	Pass
802.11ac(VH40)	5755	-9.529	-8.992	-6.242	30	Pass
	5795	-10.465	-9.444	-6.914	30	Pass
802.11n(VH20)	5775	-6.885	-6.497	-3.676	30	Pass
	5745	-7.814	-6.295	-3.978	30	Pass
	5785	-6.027	-5.252	-2.612	30	Pass
802.11n(VH40)	5825	-9.598	-8.981	-6.268	30	Pass
	5755	-9.975	-9.152	-6.534	30	Pass
802.11ac(VH80)	5795	-13.101	-12.487	-9.773	30	Pass
802.11ax(VH20)	5745	-7.394	-6.923	-4.142	30	Pass
	5785	-7.516	-6.812	-4.139	30	Pass
	5825	-6.144	-5.736	-2.925	30	Pass
802.11ax(VH40)	5755	-9.843	-8.83	-6.297	30	Pass
	5795	-10.447	-9.289	-6.819	30	Pass
802.11ax(VH80)	5775	-12.937	-12.582	-9.746	30	Pass

ANT 1





802.11ac(VH80)-5210



802.11n(HT20)-5180



802.11n(HT20)-5200



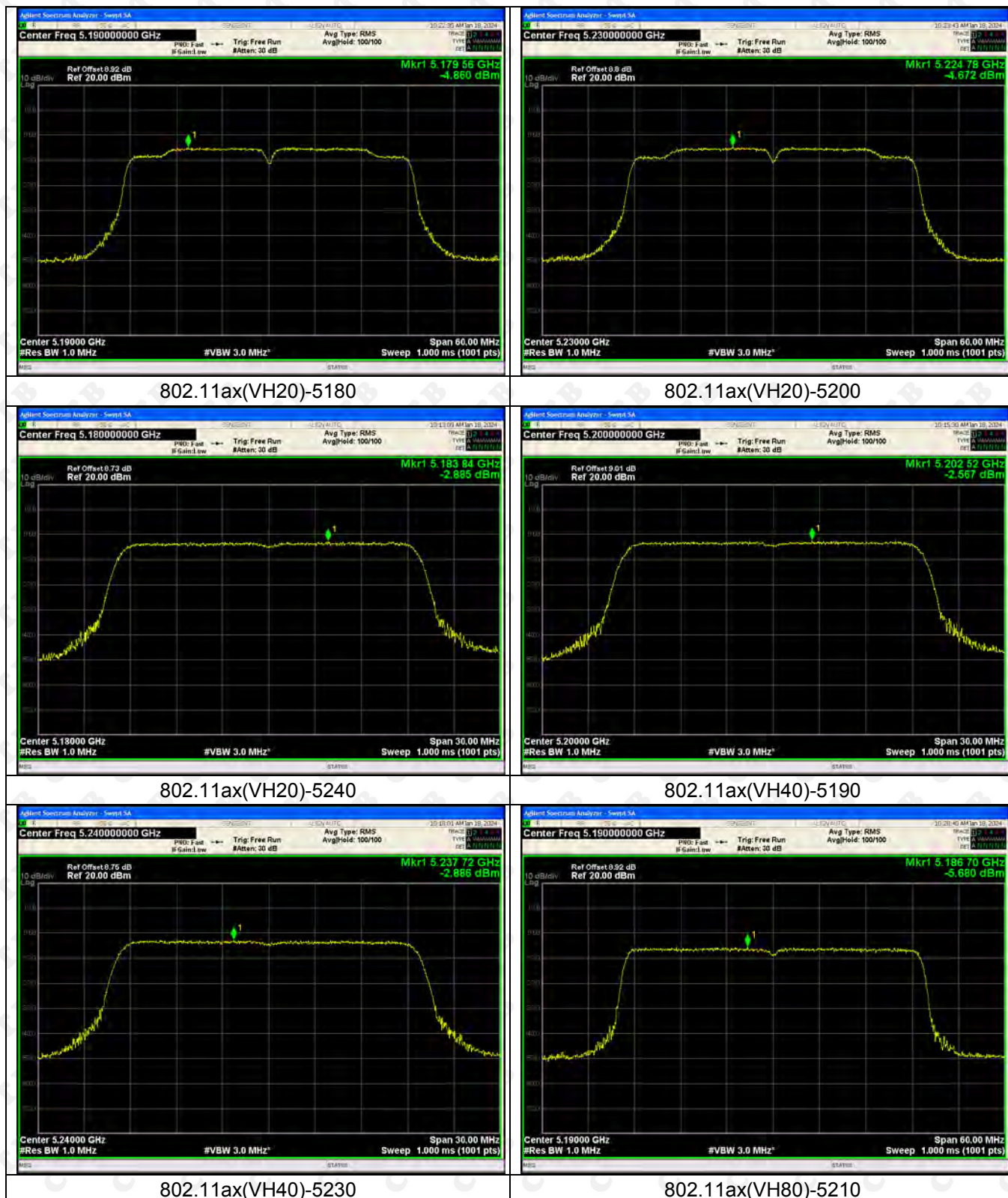
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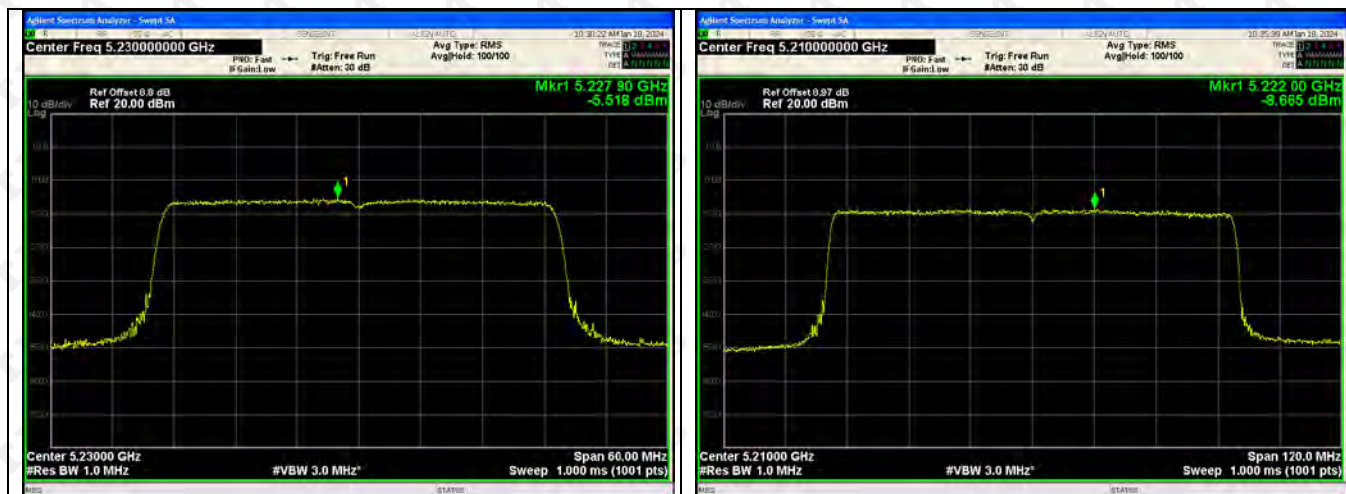


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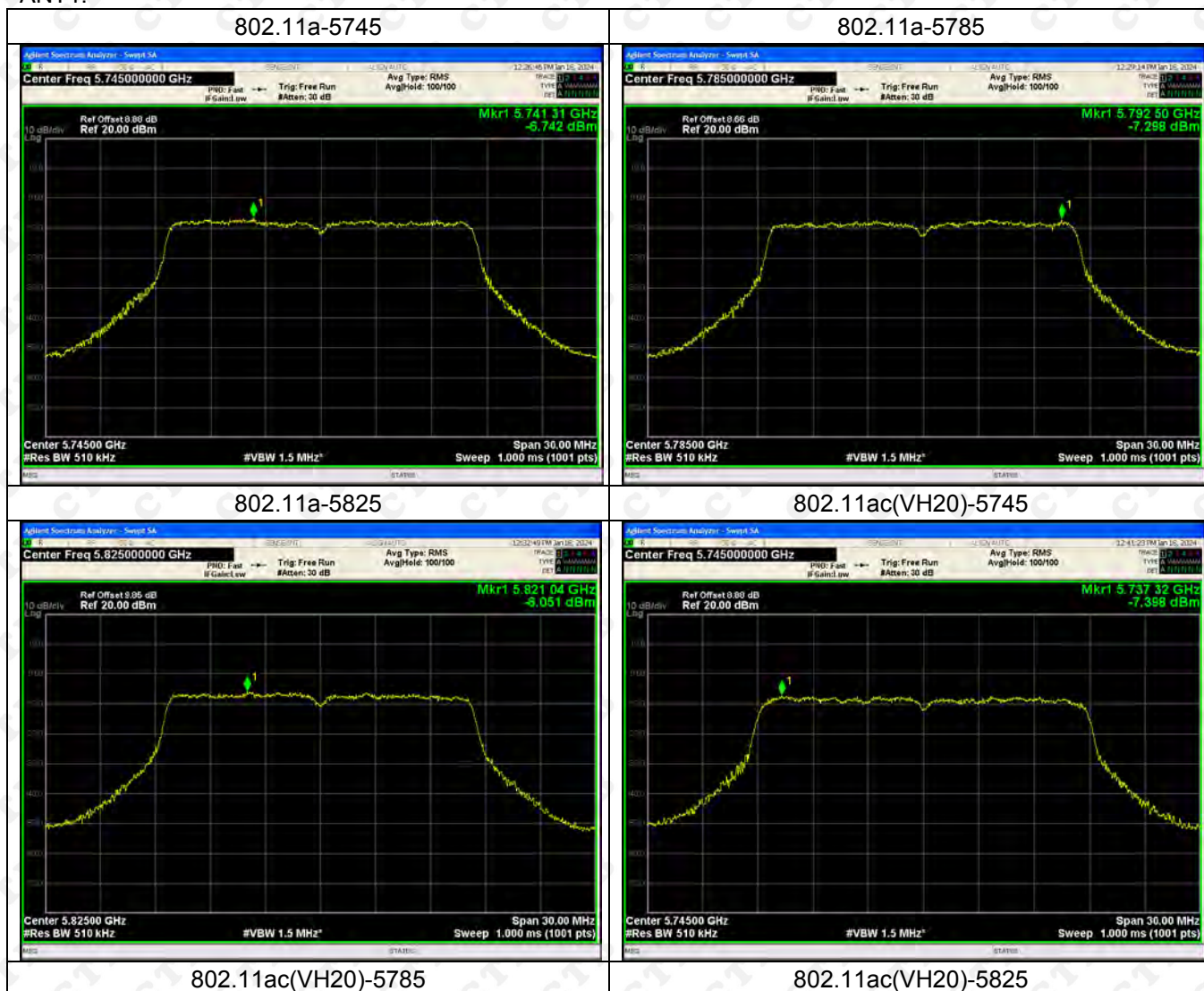


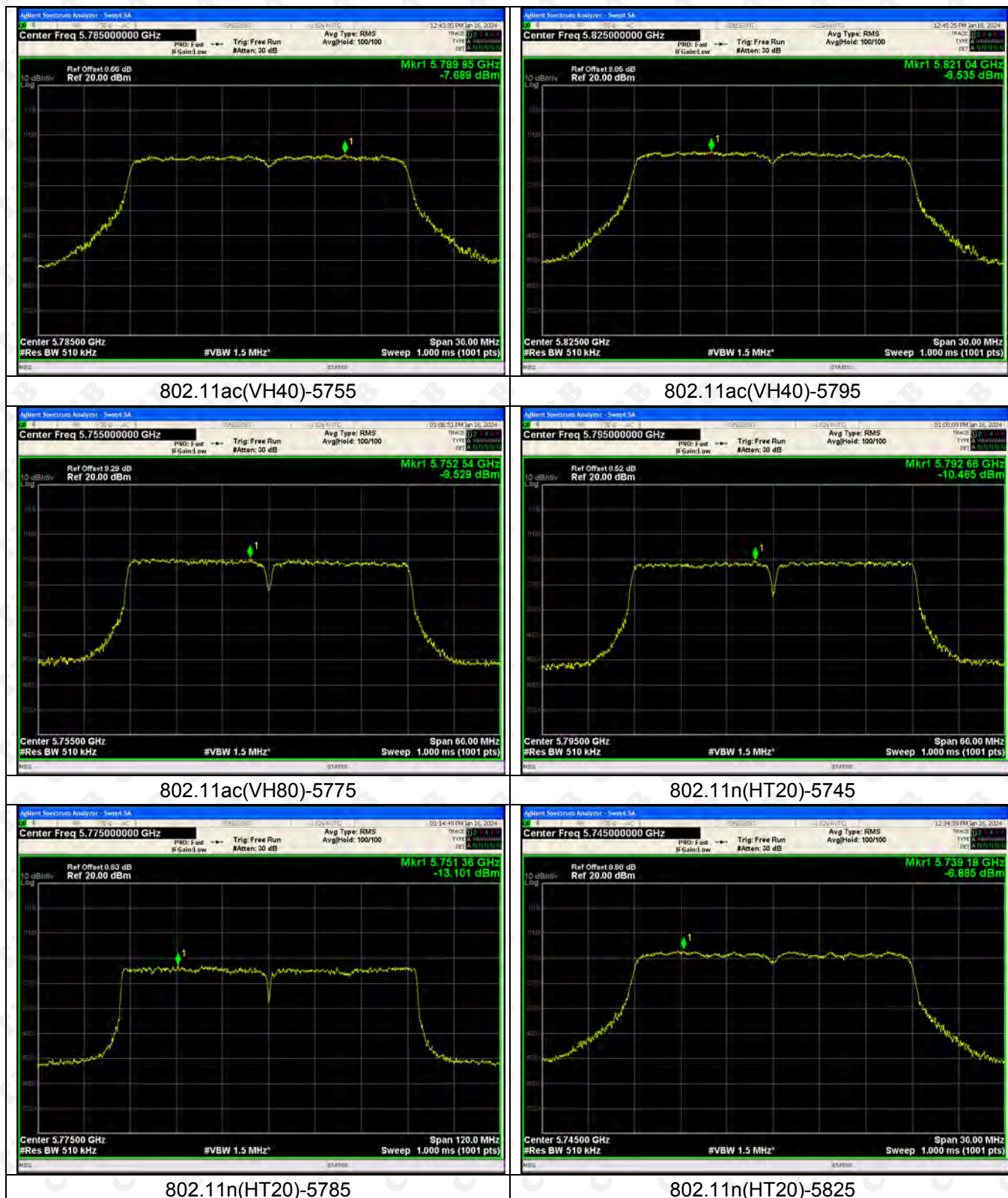
802.11n(HT40)-5230





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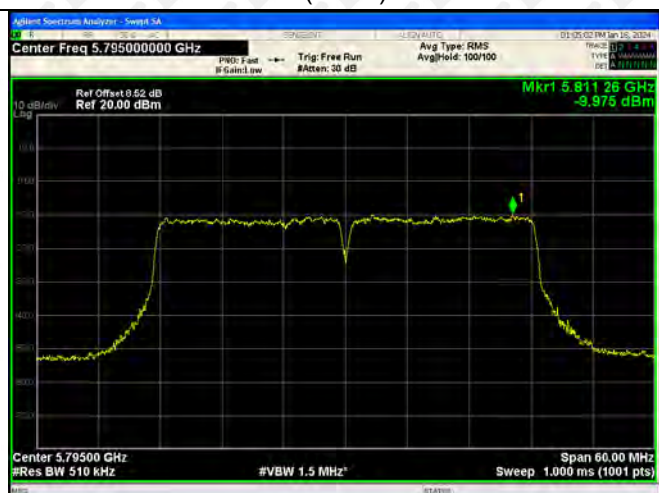
5802.11n(HT40)-5755



802.11n(HT40)-5795



802.11ax(VH20)-5745



802.11ax(VH20)-5785



802.11ax(VH20)-5825



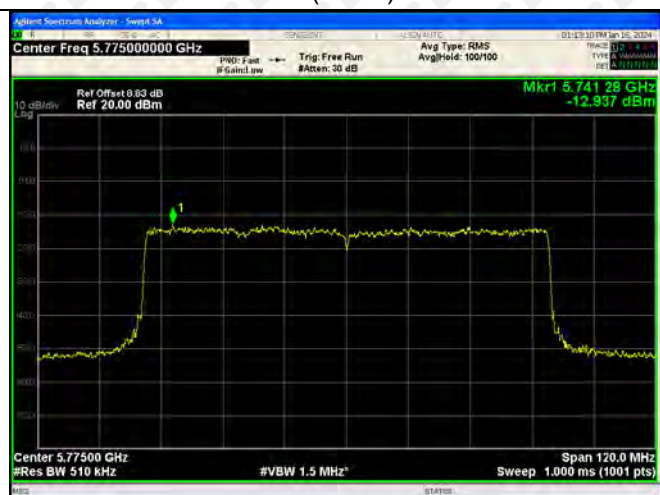
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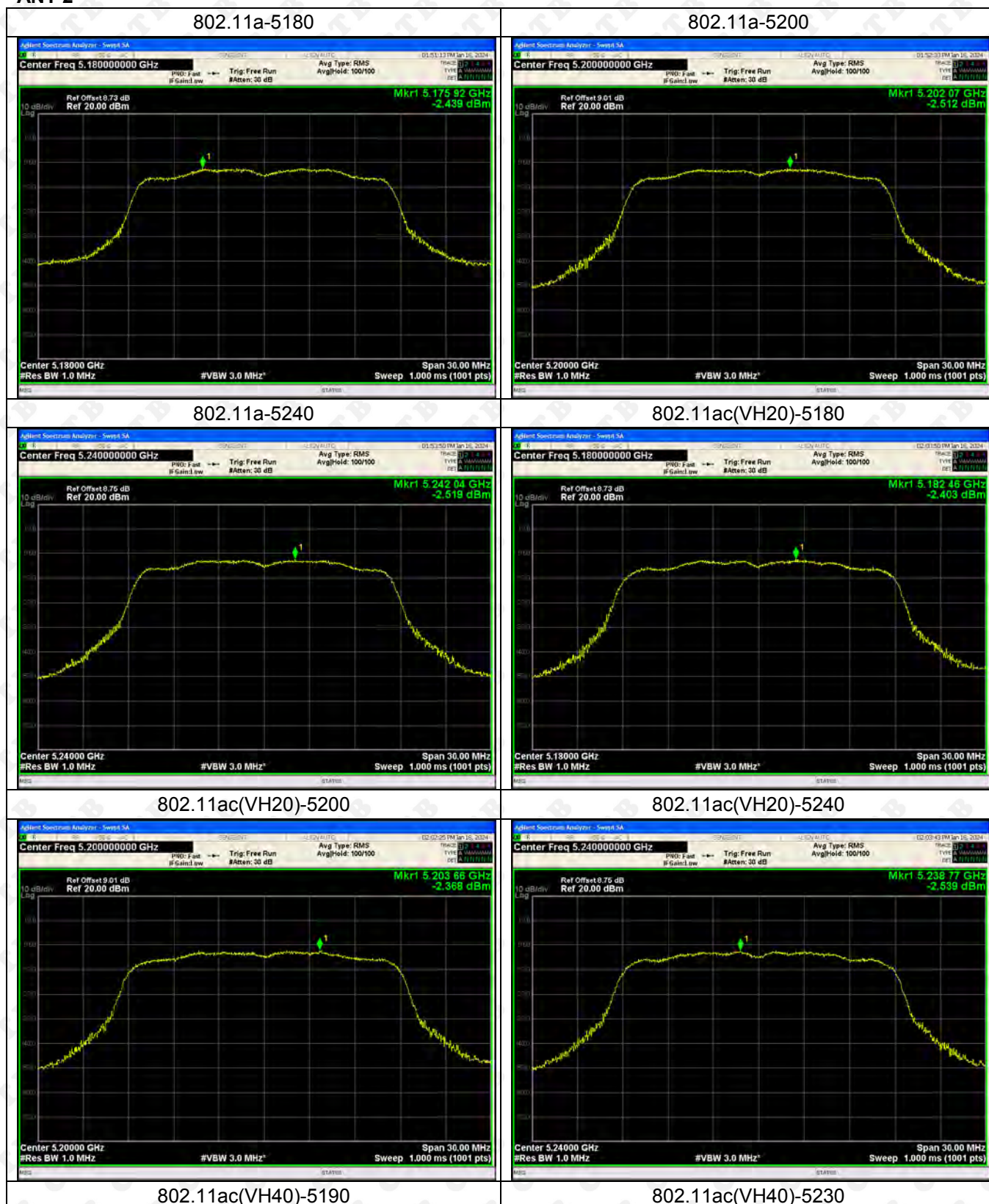
802.11ax(VH40)-5795

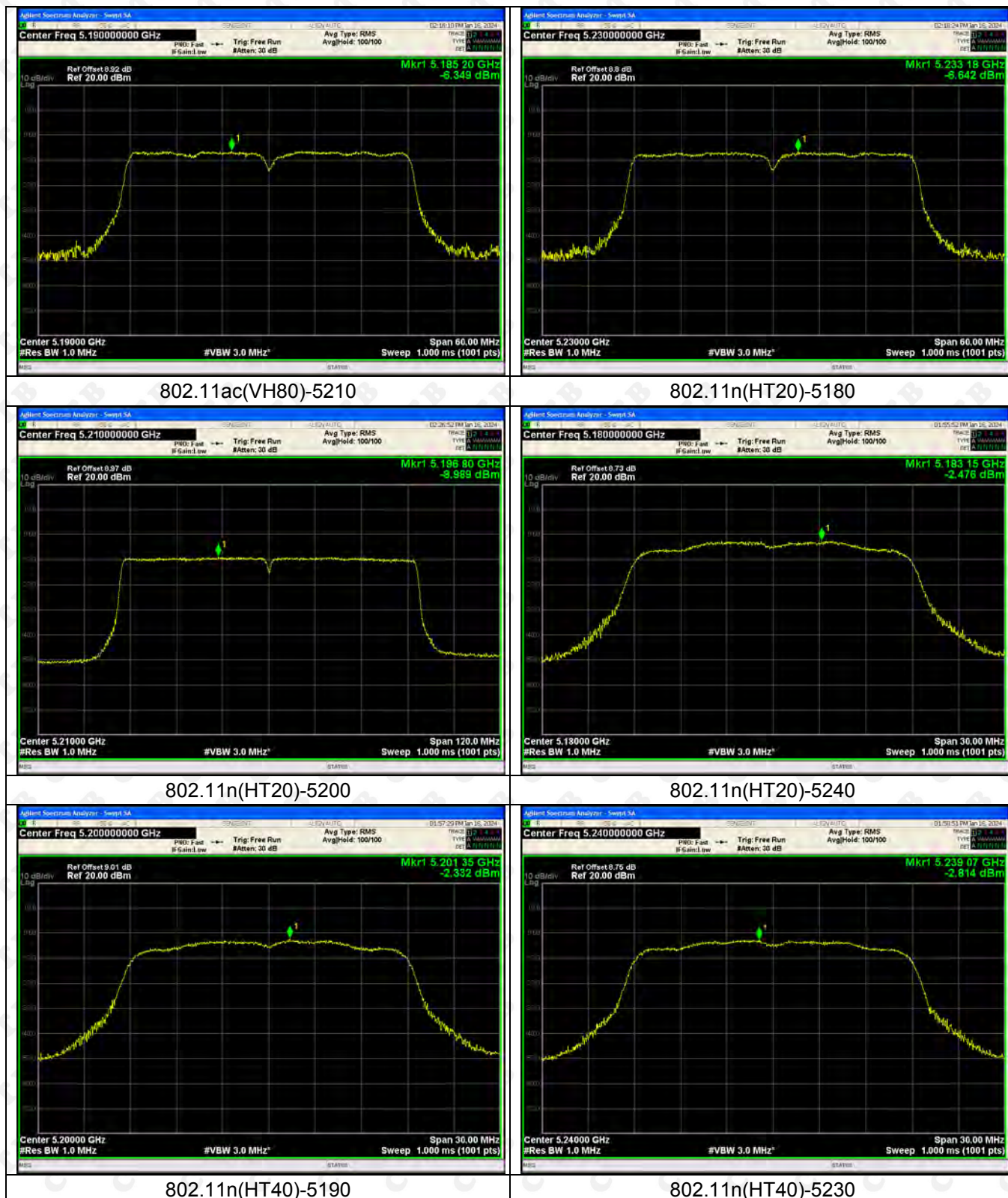


802.11ax(VH80)-5775



ANT 2







802.11ax(VH20)-5180



802.11ax(VH20)-5200



802.11ax(VH20)-5240



802.11ax(VH40)-5190



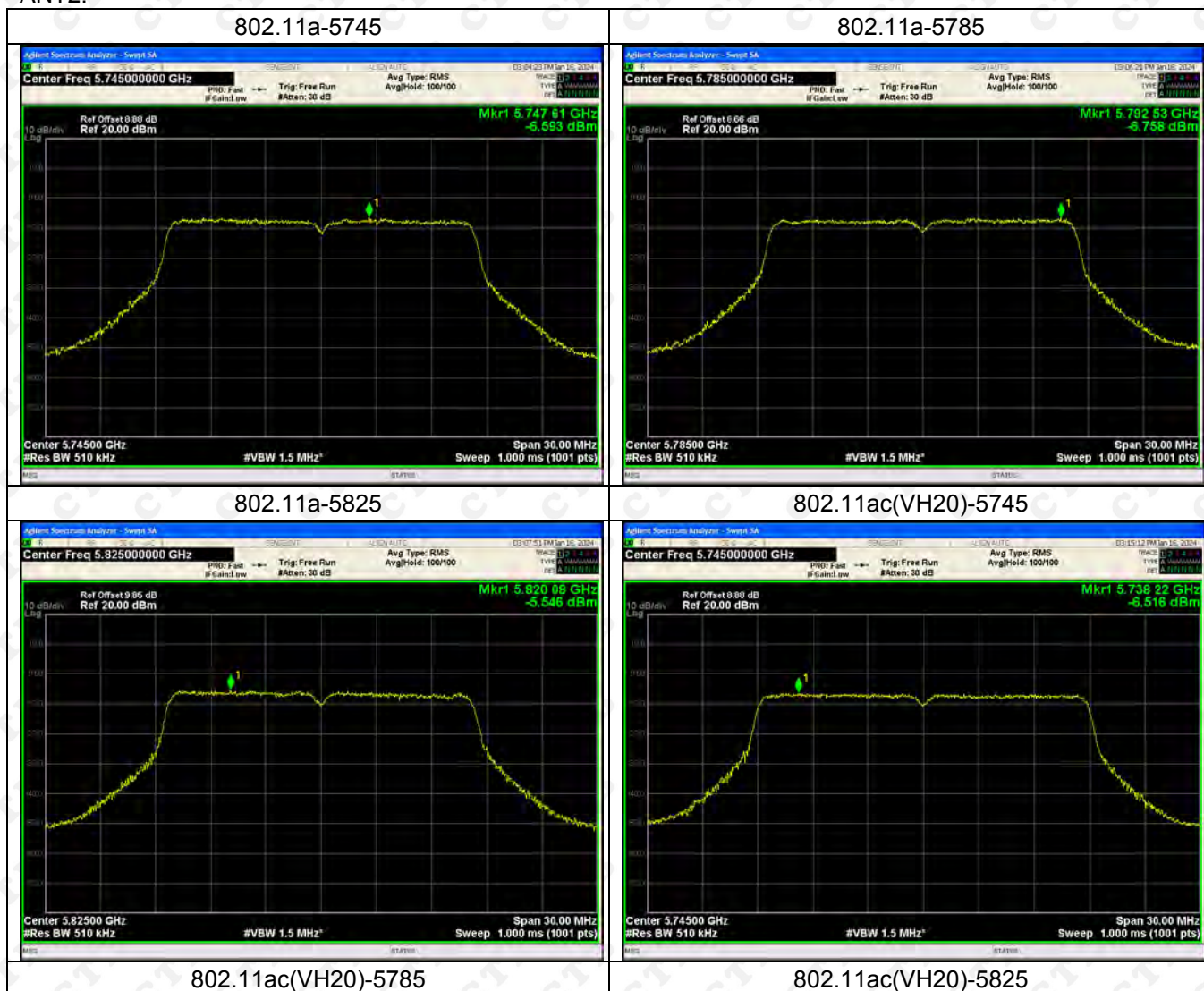
802.11ax(VH40)-5230



802.11ax(VH80)-5210



ANT2:





802.11ac(VH40)-5755



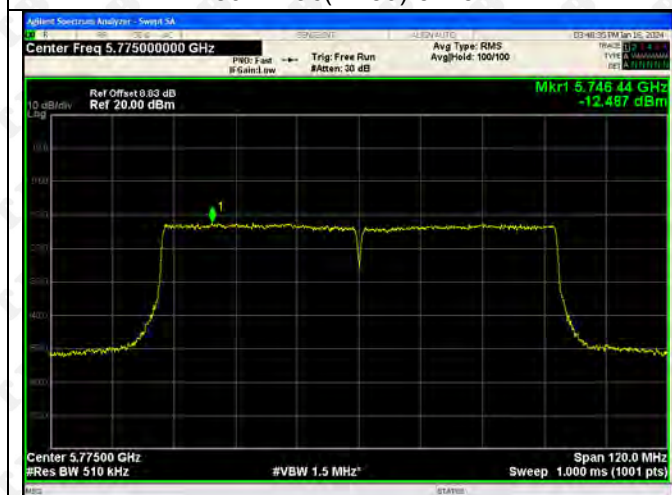
802.11ac(VH40)-5795



802.11ac(VH80)-5775



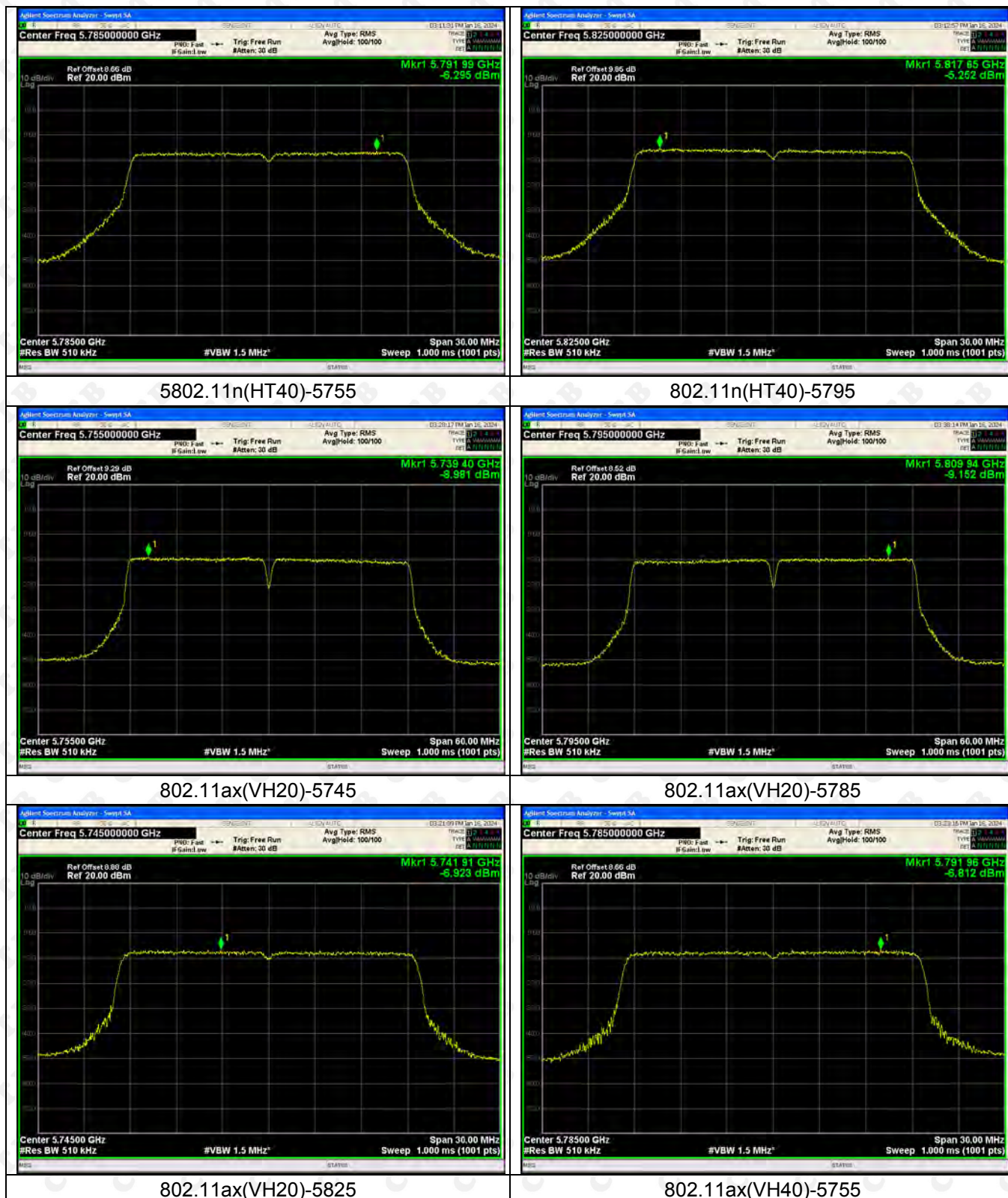
802.11n(HT20)-5745



802.11n(HT20)-5785



802.11n(HT20)-5825

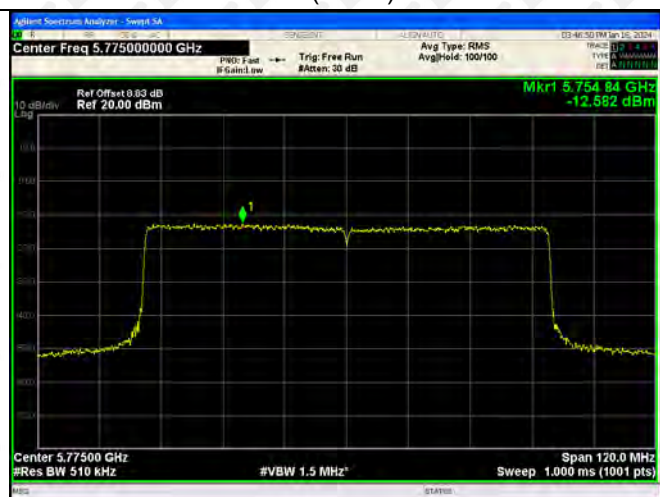




802.11ax(VH40)-5795

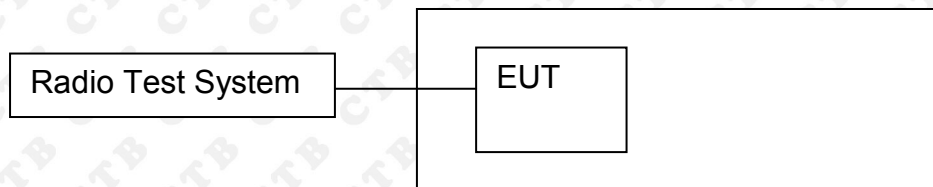


802.11ax(VH80)-5775



12. FREQUENCY STABILITY

12.1 Block Diagram Of Test Setup



12.2 Limit

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 user's manual.

12.3 Test procedure

1. The EUT was placed inside temperature chamber and powered and powered by nominal DC voltage.
2. Set EUT as normal operation.
3. Turn the EUT on and couple its output to spectrum.
4. Turn the EUT off and set the chamber to the highest temperature specified.
5. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT and measure the operating frequency.
6. Repeat step with the temperature chamber set to the lowest temperature.

12.4 Test Result

TX Frequency (5150-5250MHz)

ANT1

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	7.60	5180.1095	5180	0.1095	21.1307
		V max (V)	8.36	5180.1080	5180	0.1080	20.8557
		V min (V)	6.84	5180.1230	5180	0.1230	23.7409
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	7.6	T (°C)	0	5180.0465	5180	0.0465	8.9765
		T (°C)	10	5180.0243	5180	0.0243	4.6819
		T (°C)	20	5180.0281	5180	0.0281	5.4189
		T (°C)	30	5180.0052	5180	0.0052	1.0071
		T (°C)	40	5180.0441	5180	0.0441	8.5203
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	7.60	5200.0420	5200	0.0420	8.0697
		V max (V)	8.36	5200.0530	5200	0.0530	10.1935
		V min (V)	6.84	5200.0089	5200	0.0089	1.7155
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	7.6	T (°C)	0	5200.0073	5200	0.0073	1.3984
		T (°C)	10	5200.0264	5200	0.0264	5.0821
		T (°C)	20	5200.0028	5200	0.0028	0.5300
		T (°C)	30	5200.0006	5200	0.0006	0.1076
		T (°C)	40	5200.0273	5200	0.0273	5.2487
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	7.60	5240.0090	5240	0.0090	1.7142
		V max (V)	8.36	5240.0441	5240	0.0441	8.4235
		V min (V)	6.84	5240.0033	5240	0.0033	0.6225
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	7.6	T (°C)	0	5240.0132	5240	0.0132	2.5193
		T (°C)	10	5240.0008	5240	0.0008	0.1488
		T (°C)	20	5240.0214	5240	0.0214	4.0797
		T (°C)	30	5240.0086	5240	0.0086	1.6392
		T (°C)	40	5240.0423	5240	0.0423	8.0710
Limits				±20ppm			
Result				Complies			

TX Frequency (5725-5850MHz)

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	7.60	5745.0538	5745	0.0538	9.3572
		V max (V)	8.36	5745.0383	5745	0.0383	6.6722
		V min (V)	6.84	5745.0538	5745	0.0538	9.3572
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	7.6	T (°C)	0	5745.0376	5745	0.0376	6.5361
		T (°C)	10	5745.0776	5745	0.0776	13.4993
		T (°C)	20	5745.0293	5745	0.0293	5.0923
		T (°C)	30	5745.0464	5745	0.0464	8.0834
		T (°C)	40	5745.0051	5745	0.0051	0.8823
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	7.60	5785.0453	5785	0.0453	7.8273
		V max (V)	8.36	5785.0180	5785	0.0180	3.1129
		V min (V)	7.84	5785.0636	5785	0.0636	10.9910
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	7.6	T (°C)	0	5785.0235	5785	0.0235	4.0557
		T (°C)	10	5785.0516	5785	0.0516	8.9190
		T (°C)	20	5785.0118	5785	0.0118	2.0354
		T (°C)	30	5785.0451	5785	0.0451	7.7949
		T (°C)	40	5785.0680	5785	0.0680	11.7632
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	7.60	5825.0712	5825	0.0712	12.2152
		V max (V)	8.36	5825.0537	5825	0.0537	9.2129
		V min (V)	6.84	5825.0513	5825	0.0513	8.8075
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	7.6	T (°C)	0	5825.0072	5825	0.0072	1.2323
		T (°C)	10	5825.0197	5825	0.0197	3.3795
		T (°C)	20	5825.0669	5825	0.0669	11.4865
		T (°C)	30	5825.0722	5825	0.0722	12.3968
		T (°C)	40	5825.0543	5825	0.0543	9.3178
Limits				±20ppm			
Result				Complies			

ANT2:

TX Frequency (5150-5250MHz)

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	7.60	5180.0334	5180	0.0334	6.4387
		V max (V)	8.36	5180.0262	5180	0.0262	5.0575
		V min (V)	6.84	5180.0610	5180	0.0610	11.7830
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	7.6	T (°C)	0	5180.0876	5180	0.0876	16.9170
		T (°C)	10	5180.0355	5180	0.0355	6.8567
		T (°C)	20	5180.0853	5180	0.0853	16.4589
		T (°C)	30	5180.0558	5180	0.0558	10.7706
		T (°C)	40	5180.0278	5180	0.0278	5.3603
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	7.60	5200.0838	5200	0.0838	16.1164
		V max (V)	8.36	5200.0149	5200	0.0149	2.8653
		V min (V)	6.84	5200.0680	5200	0.0680	13.0692
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	7.6	T (°C)	0	5200.0875	5200	0.0875	16.8195
		T (°C)	10	5200.0655	5200	0.0655	12.5970
		T (°C)	20	5200.0775	5200	0.0775	14.9007
		T (°C)	30	5200.0270	5200	0.0270	5.1861
		T (°C)	40	5200.0203	5200	0.0203	3.9059
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	7.60	5240.0638	5240	0.0638	12.1779
		V max (V)	8.36	5240.0478	5240	0.0478	9.1307
		V min (V)	6.84	5240.0208	5240	0.0208	3.9641
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	7.6	T (°C)	0	5240.0363	5240	0.0363	6.9221
		T (°C)	10	5240.0928	5240	0.0928	17.7142
		T (°C)	20	5240.0071	5240	0.0071	1.3593
		T (°C)	30	5240.0100	5240	0.0100	1.9160
		T (°C)	40	5240.0378	5240	0.0378	7.2147
Limits				±20ppm			
Result				Complies			

TX Frequency (5725-5850MHz)

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	7.60	5745.0248	5745	0.0248	4.3248
		V max (V)	8.36	5745.0032	5745	0.0032	0.5615
		V min (V)	6.84	5745.0764	5745	0.0764	13.3019
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	7.6	T (°C)	0	5745.0563	5745	0.0563	9.7976
		T (°C)	10	5745.0000	5745	0.0000	0.0005
		T (°C)	20	5745.0315	5745	0.0315	5.4756
		T (°C)	30	5745.0308	5745	0.0308	5.3645
		T (°C)	40	5745.0564	5745	0.0564	9.8105
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	7.60	5785.0030	5785	0.0030	0.5237
		V max (V)	8.36	5785.0654	5785	0.0654	11.3079
		V min (V)	6.84	5785.0662	5785	0.0662	11.4357
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	7.6	T (°C)	0	5785.0681	5785	0.0681	11.7760
		T (°C)	10	5785.0324	5785	0.0324	5.6089
		T (°C)	20	5785.0760	5785	0.0760	13.1382
		T (°C)	30	5785.0661	5785	0.0661	11.4321
		T (°C)	40	5785.0499	5785	0.0499	8.6252
		T (°C)	50	5785.0049	5785	0.0049	0.8409
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	7.60	5825.0746	5825	0.0746	12.7996
		V max (V)	8.36	5825.0142	5825	0.0142	2.4302
		V min (V)	6.84	5825.0196	5825	0.0196	3.3675
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	7.6	T (°C)	0	5825.0803	5825	0.0803	13.7912
		T (°C)	10	5825.0379	5825	0.0379	6.5031
		T (°C)	20	5825.0010	5825	0.0010	0.1774
		T (°C)	30	5825.0653	5825	0.0653	11.2063
		T (°C)	40	5825.0798	5825	0.0798	13.6930
Limits				±20ppm			
Result				Complies			

13. OPERATION IN THE ABSENCE OF INFORMATION TO THE TRANSMIT

13.1 Requirement

15.407(c) requirement:

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signal ling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

13.2 Test Results

Operation in the absence of information to the transmit:

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ASK message transmitting from remote device and verify whether it shall resend or discontinue transmission. (manufacturer declare)

14. ANTENNA REQUIREMENT

15.203 requirement:

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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

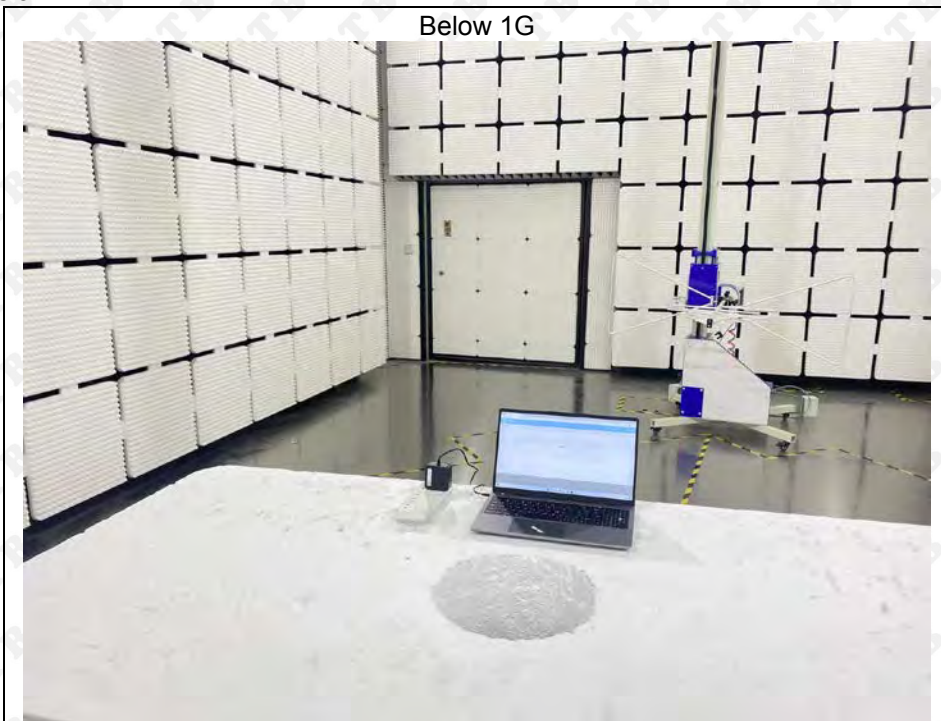
EUT Antenna:

The antenna is Internal antenna and no consideration of replacement. The best case gain of the antenna is WiFi (5.2G):Ant1: 2.31dBi, Ant2: 4.01dBi, WiFi (5.8G):Ant1:3.61dBi, Ant2: 3.47dBi

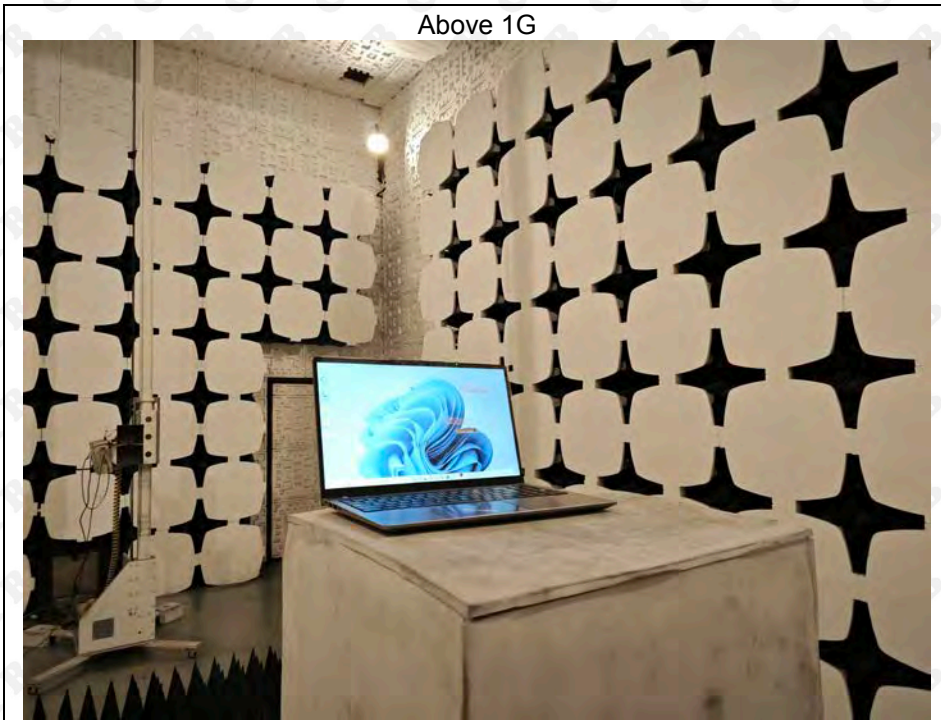
15. EUT TEST SETUP PHOTOGRAPHS

Radiated Emission

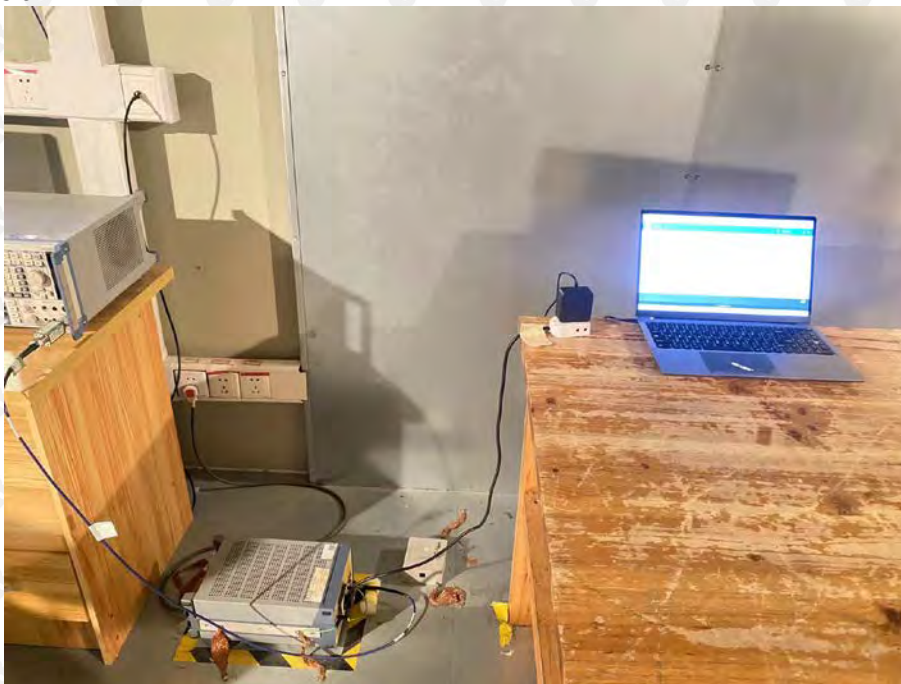
Below 1G



Above 1G



Conducted Emission



***** END OF REPORT *****