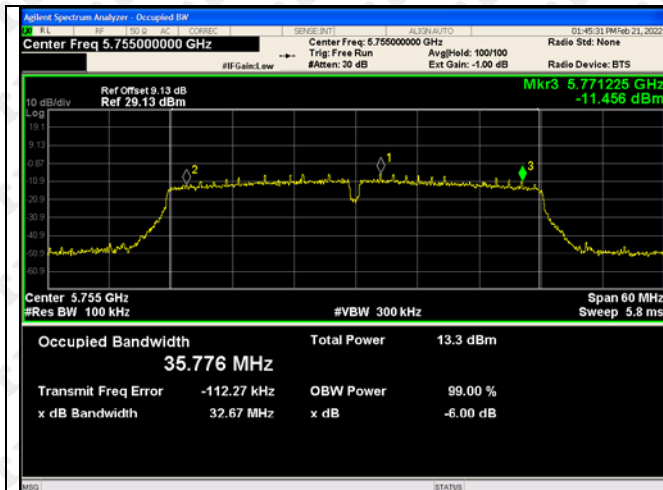
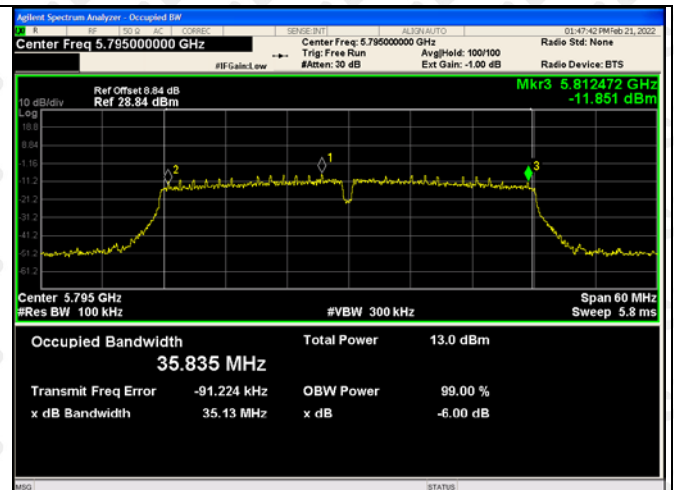
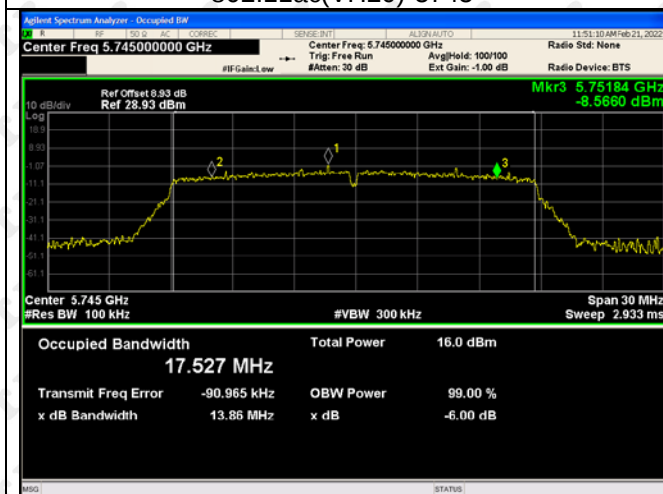




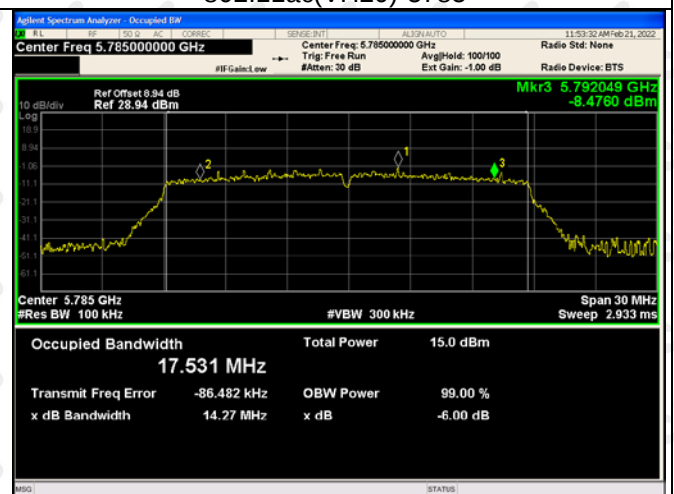
802.11ac(VH20)-5745



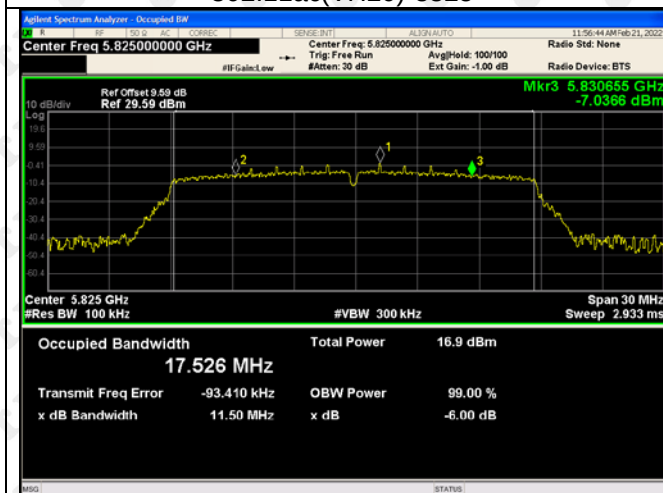
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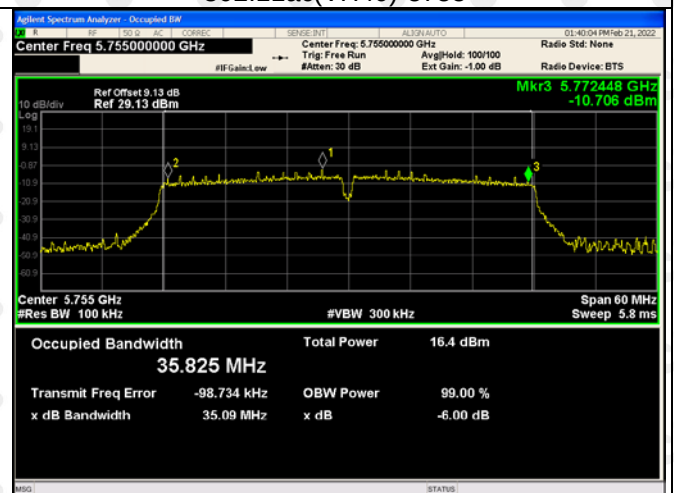
802.11ac(VH20)-5825



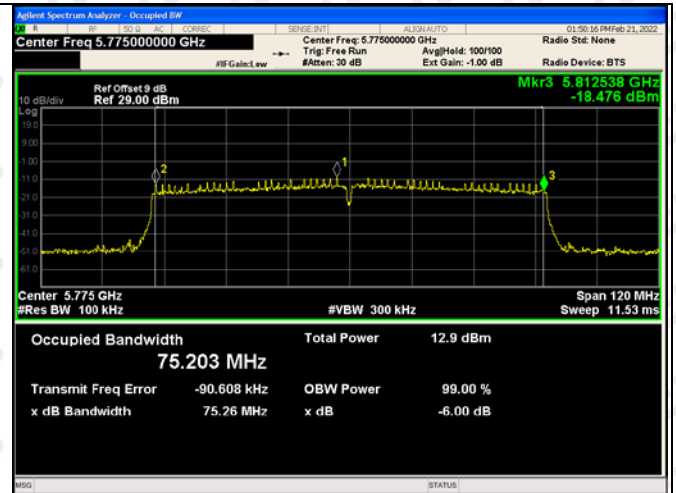
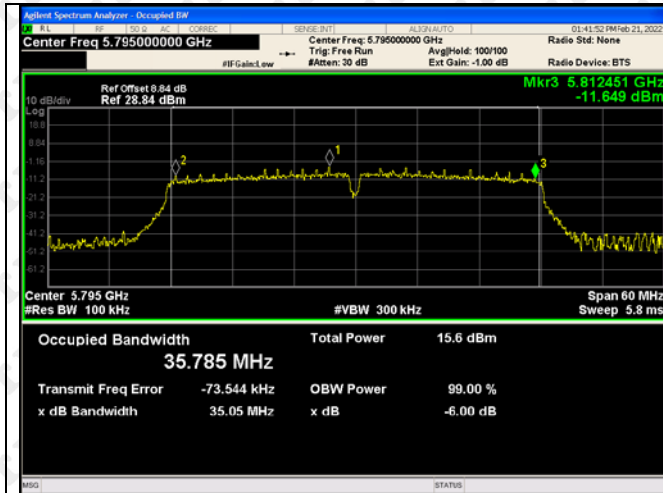
802.11ac(VH40)-5755



802.11ac(VH40)-5795

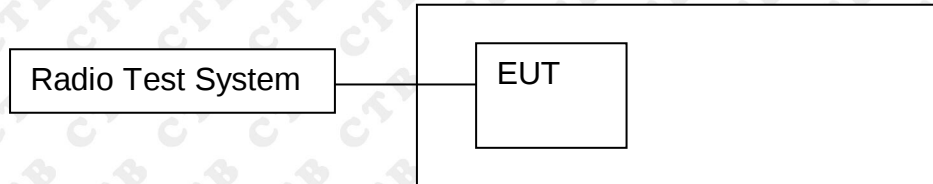


802.11ac(VH80)-5775



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.1.a).

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

c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10 \log (500 \text{ kHz/RBW})$ to the measured result, whereas RBW ($< 500 \text{ kHz}$) 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 $10 \log (1 \text{ MHz/RBW})$ to the measured result, whereas RBW ($< 1 \text{ MHz}$) 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.

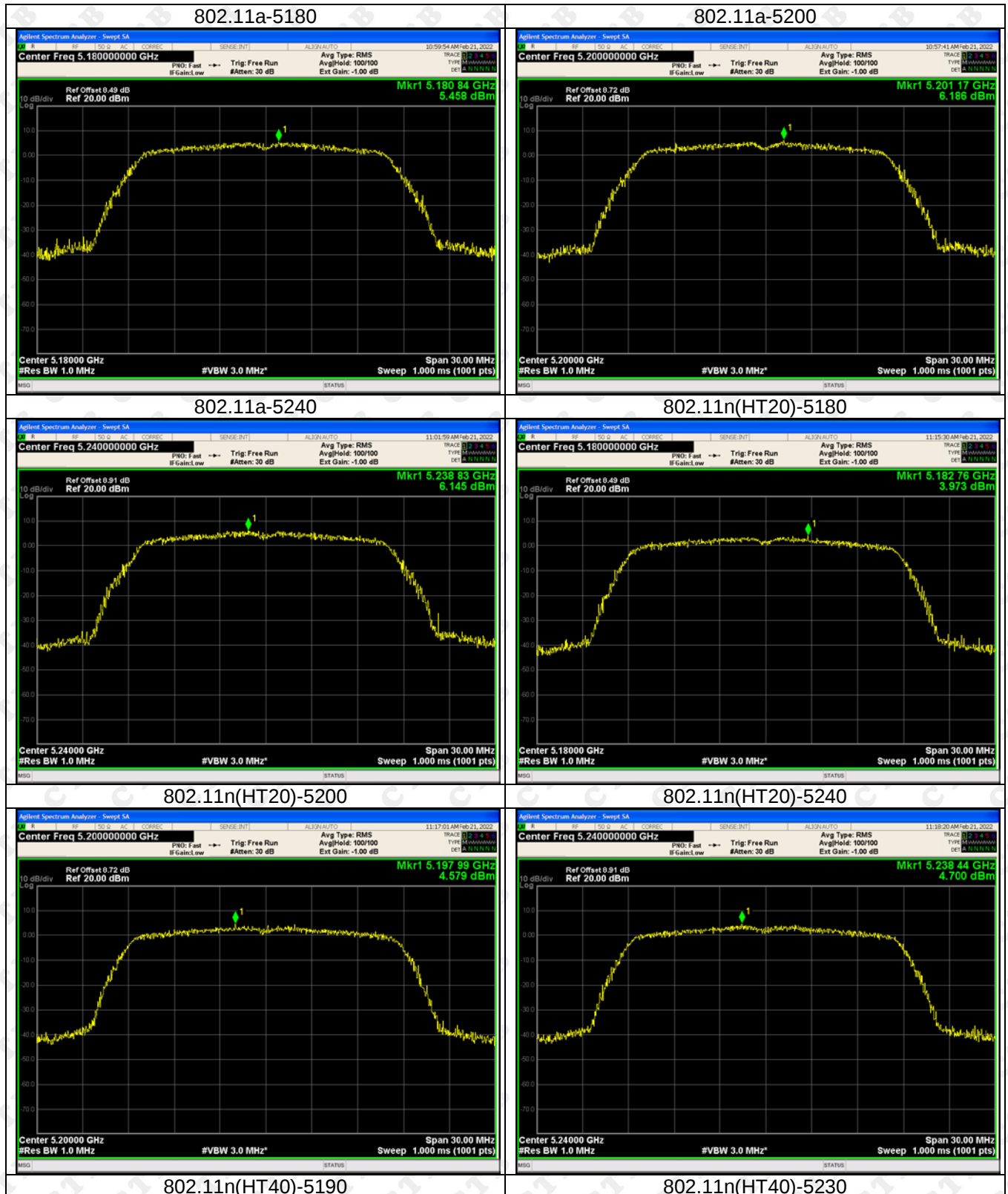
Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the II.F.5.c) and II.F.5.d), since RBW=100 kHz is available on nearly all spectrum analyzers.

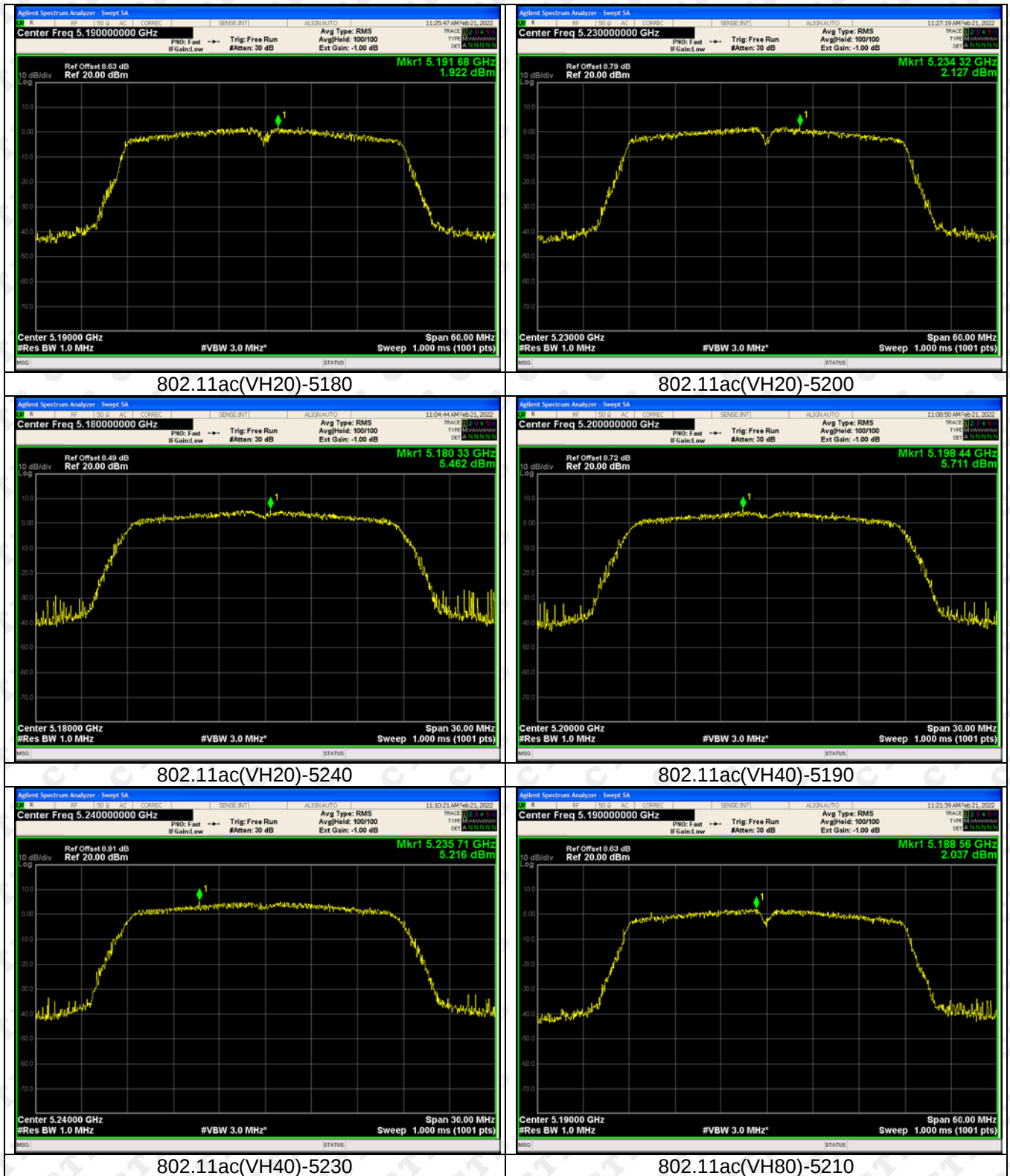
11.4 Test Result

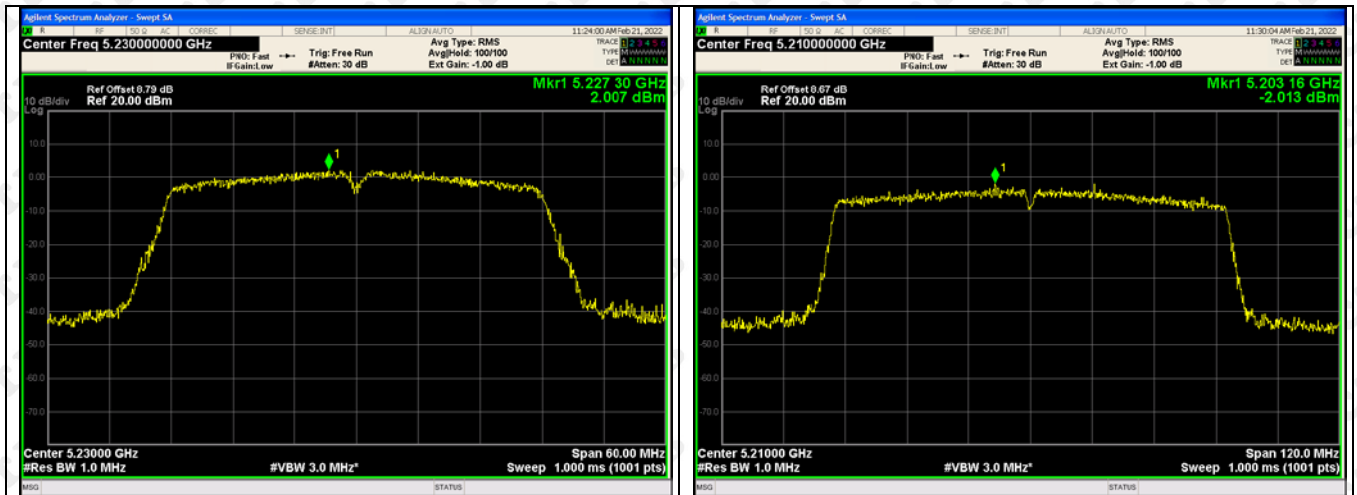
Test mode	Test Channel (MHz)	PSD [dBm/MHz]	Limit [dBm/MHz]	Result
802.11a	5180	5.458	11	Pass
	5200	6.186	11	Pass
	5240	6.145	11	Pass
802.11ac(VH20)	5180	3.973	11	Pass
	5200	4.579	11	Pass
	5240	4.7	11	Pass
802.11ac(VH40)	5190	1.922	11	Pass
	5230	2.127	11	Pass
802.11ac(VH80)	5210	5.462	11	Pass
802.11n(HT20)	5180	5.711	11	Pass
	5200	5.216	11	Pass
	5240	2.037	11	Pass
802.11n(HT40)	5190	2.007	11	Pass
	5230	-2.013	11	Pass

Test mode	Test Channel (MHz)	PSD [dBm/500kHz]	Result
802.11a	5745	3.203	Pass
	5785	2.762	Pass
	5825	3.963	Pass
802.11n(HT20)	5745	0.546	Pass
	5785	0.112	Pass
	5825	0.601	Pass
802.11n(HT40)	5755	-3.339	Pass
	5795	-2.965	Pass
802.11ac(VH20)	5745	2.715	Pass
	5785	1.329	Pass
	5825	4.047	Pass
802.11ac(VH40)	5755	0.417	Pass
	5795	-1.2	Pass
802.11ac(VH80)	5775	-7.319	Pass

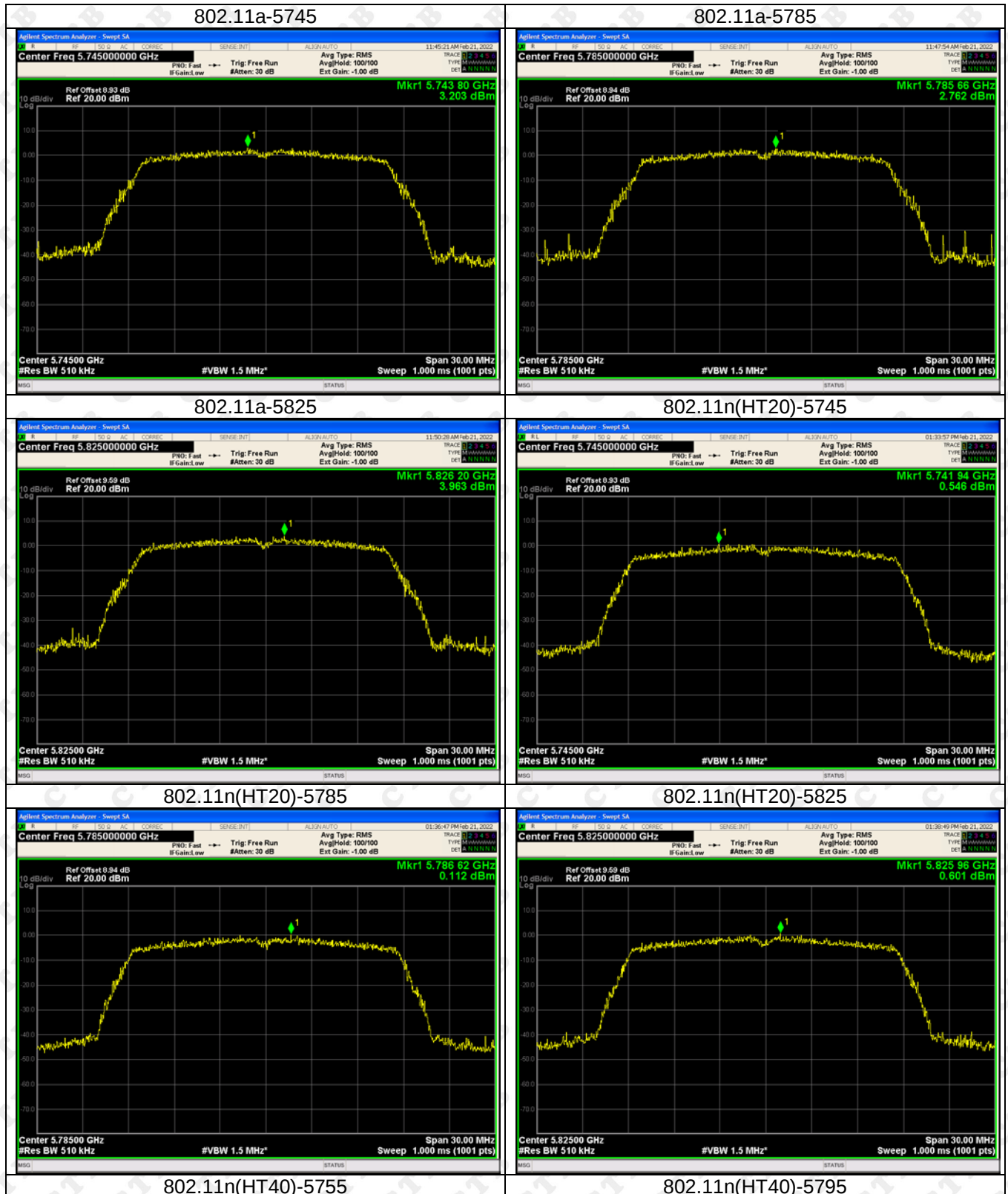
5180-5230MHz

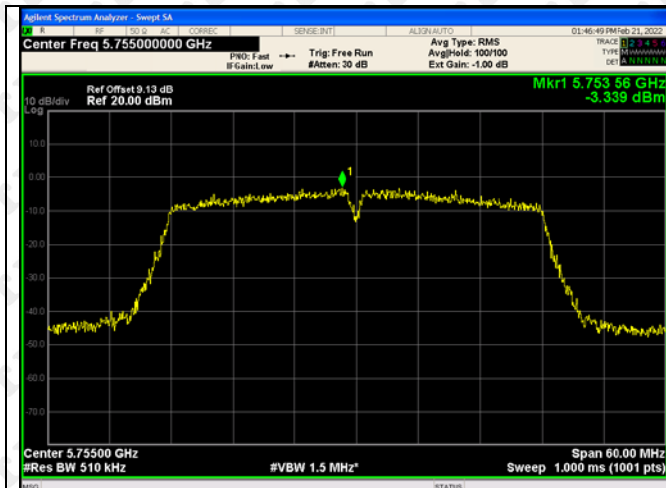




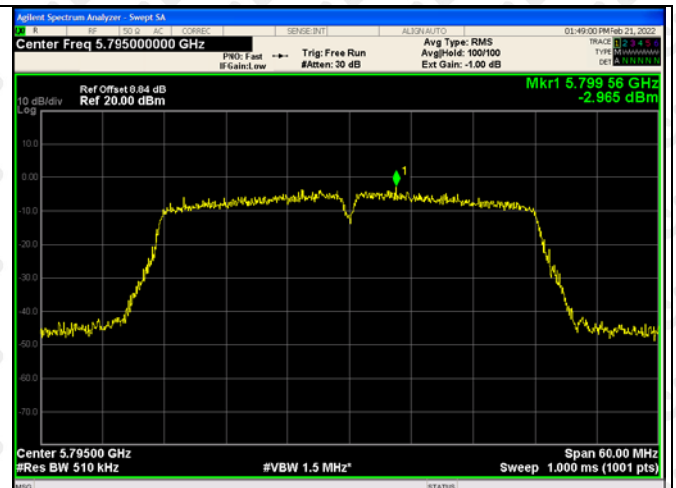


5745-5825MHz

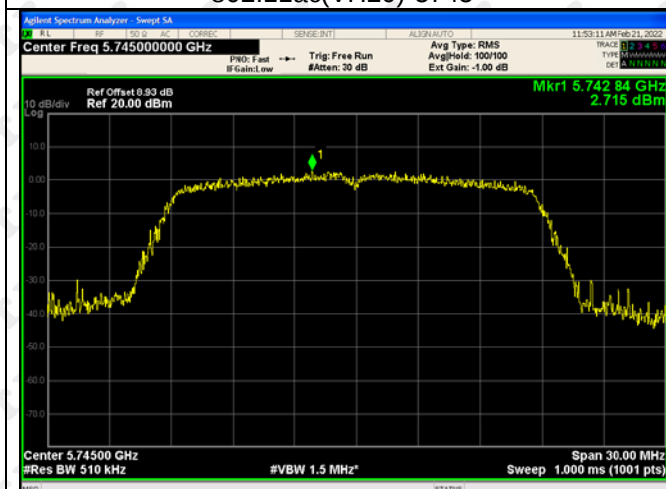




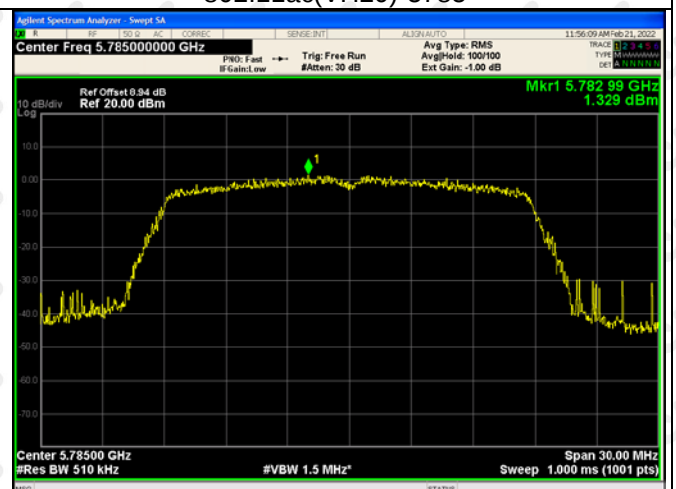
802.11ac(VH20)-5745



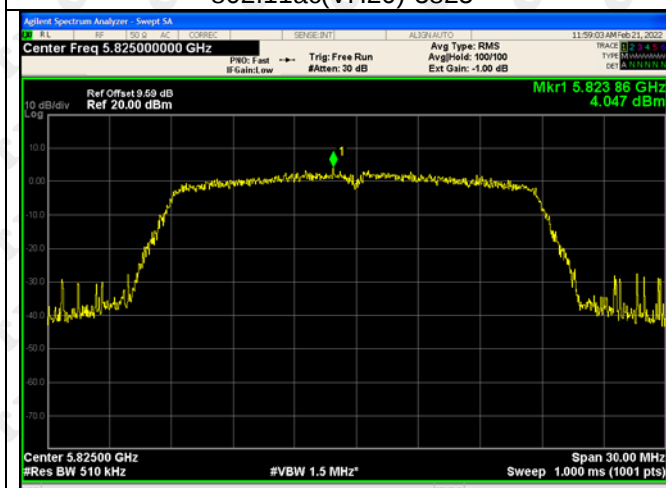
802.11ac(VH20)-5785



802.11ac(VH20)-5825



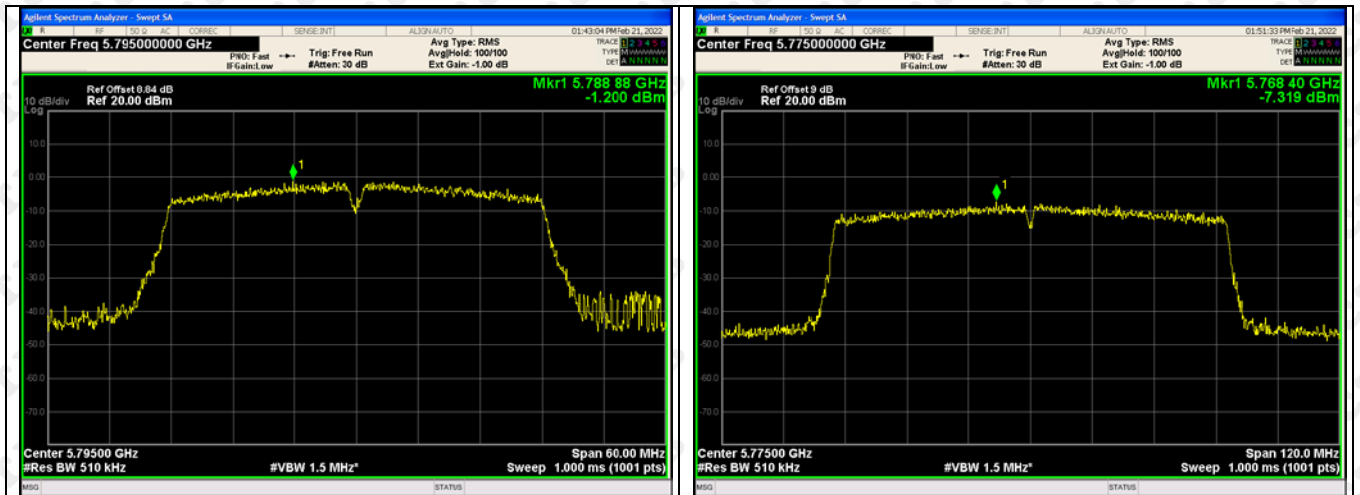
802.11ac(VH40)-5755



802.11ac(VH40)-5795

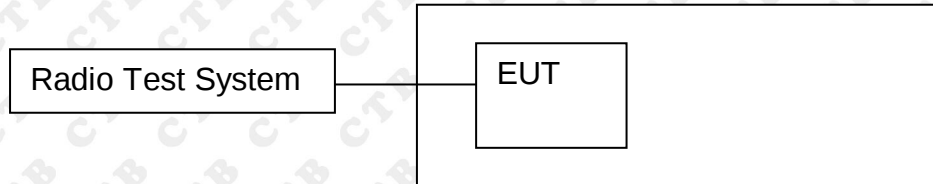


802.11ac(VH80)-5775



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 (5180-5240MHz)

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	3.60	5180.0556	5180	0.0556	10.7336
		V max (V)	4.14	5180.0323	5180	0.0323	6.2355
		V min (V)	3.06	5180.0246	5180	0.0246	4.7490
Limits				5150-5250 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.6	T (°C)	-20	5180.0054	5180	0.0054	1.0425
		T (°C)	-10	5180.0105	5180	0.0105	2.0270
		T (°C)	0	5180.0323	5180	0.0323	6.2355
		T (°C)	10	5180.0386	5180	0.0386	7.4517
		T (°C)	20	5180.0293	5180	0.0293	5.6564
		T (°C)	30	5180.0218	5180	0.0218	4.2085
		T (°C)	40	5180.0125	5180	0.0125	2.4131
		T (°C)	50	5180.0097	5180	0.0097	1.8726
		T (°C)	60	5180.0414	5180	0.0414	7.9923
		T (°C)	70	5180.0697	5180	0.0697	13.4556
Limits				5150-5250 MHz			
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)	3.60	5200.0254	5200	0.0254	4.8846
		V max (V)	4.14	5200.0428	5200	0.0428	8.2308
		V min (V)	3.06	5200.0694	5200	0.0694	13.3462
Limits				5150-5250MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.6	T (°C)	-20	5200.0633	5200	0.0633	12.1731
		T (°C)	-10	5200.0526	5200	0.0526	10.1154
		T (°C)	0	5200.0434	5200	0.0434	8.3462
		T (°C)	10	5200.0928	5200	0.0928	17.8462
		T (°C)	20	5200.0635	5200	0.0635	12.2115
		T (°C)	30	5200.0124	5200	0.0124	2.3846
		T (°C)	40	5200.0733	5200	0.0733	14.0962
		T (°C)	50	5200.0416	5200	0.0416	8.0000
		T (°C)	60	5200.0325	5200	0.0325	6.2500
		T (°C)	70	5200.0427	5200	0.0427	8.2115
Limits				5150-5250 MHz			
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)	3.60	5240.0136	5240	0.0136	2.5954
		V max (V)	4.14	5240.0414	5240	0.0414	7.9008
		V min (V)	3.06	5240.0097	5240	0.0097	1.8511
Limits				5150-5250 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.6	T (°C)	-20	5240.0094	5240	0.0094	1.7939
		T (°C)	-10	5240.0035	5240	0.0035	0.6679
		T (°C)	0	5240.0144	5240	0.0144	2.7481
		T (°C)	10	5240.0856	5240	0.0856	16.3359
		T (°C)	20	5240.0114	5240	0.0114	2.1756
		T (°C)	30	5240.0125	5240	0.0125	2.3855
		T (°C)	40	5240.0063	5240	0.0063	1.2023
		T (°C)	50	5240.0076	5240	0.0076	1.4504
		T (°C)	60	5240.0053	5240	0.0053	1.0115
		T (°C)	70	5240.0105	5240	0.0105	2.0038
Limits				5150-5250 MHz			
Result				Complies			

TX Frequency(5745-5825MHz)

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (° C)	20	V nom (V)	3.60	5745.00775	5745	0.00775	1.3487
		V max (V)	4.14	5745.00065	5745	0.00065	0.1137
		V min (V)	3.06	5745.00765	5745	0.00765	1.3324
Limits				5725-5850 MHz			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.6	T (°C)	-20	5745.00973	5745	0.00973	1.6928
		T (°C)	-10	5745.00142	5745	0.00142	0.2475
		T (°C)	0	5745.00474	5745	0.00474	0.8257
		T (°C)	10	5745.00742	5745	0.00742	1.2919
		T (°C)	20	5745.00798	5745	0.00798	1.3893
		T (°C)	30	5745.00033	5745	0.00033	0.0572
		T (°C)	40	5745.00274	5745	0.00274	0.4770
		T (°C)	50	5745.01156	5745	0.01156	2.0130
		T (°C)	60	5745.00868	5745	0.00868	1.5105
		T (°C)	70	5745.00391	5745	0.00391	0.6800
Limits				5725-5850 MHz			
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)	3.60	5785.00699	5785	0.00699	1.2090
		V max (V)	4.14	5785.00809	5785	0.00809	1.3989
		V min (V)	3.06	5785.00014	5785	0.00014	0.0247
Limits				5725-5850 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.6	T (°C)	-20	5785.00334	5785	0.00334	0.5770
		T (°C)	-10	5785.00004	5785	0.00004	0.0069
		T (°C)	0	5785.01049	5785	0.01049	1.8133
		T (°C)	10	5785.00620	5785	0.00620	1.0714
		T (°C)	20	5785.01141	5785	0.01141	1.9724
		T (°C)	30	5785.00602	5785	0.00602	1.0403
		T (°C)	40	5785.01035	5785	0.01035	1.7900
		T (°C)	50	5785.00192	5785	0.00192	0.3321
		T (°C)	60	5785.00237	5785	0.00237	0.4103
		T (°C)	70	5785.00387	5785	0.00387	0.6697
Limits				5725-5850 MHz			
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)	3.60	5825.01351	5825	0.01351	2.3199
		V max (V)	4.14	5825.00819	5825	0.00819	1.4064
		V min (V)	3.06	5825.00560	5825	0.00560	0.9611
Limits				5725-5850 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	3.6	T (°C)	-20	5825.00112	5825	0.00112	0.1926
		T (°C)	-10	5825.00392	5825	0.00392	0.6721
		T (°C)	0	5825.00725	5825	0.00725	1.2445
		T (°C)	10	5825.01271	5825	0.01271	2.1822
		T (°C)	20	5825.00004	5825	0.00004	0.0070
		T (°C)	30	5825.00515	5825	0.00515	0.8844
		T (°C)	40	5825.00784	5825	0.00784	1.3452
		T (°C)	50	5825.01352	5825	0.01352	2.3218
		T (°C)	60	5825.00781	5825	0.00781	1.3399
		T (°C)	70	5825.00134	5825	0.00134	0.2295
Limits				5725-5850 MHz			
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.

EUT Antenna:

The antenna is Internal Antenna and no consideration of replacement. The best case gain of the antenna is 3.0dBi.

15. EUT PHOTOGRAPHS

EUT Photo 1



EUT Photo 2



16. EUT TEST SETUP PHOTOGRAPHS

Spurious emissions

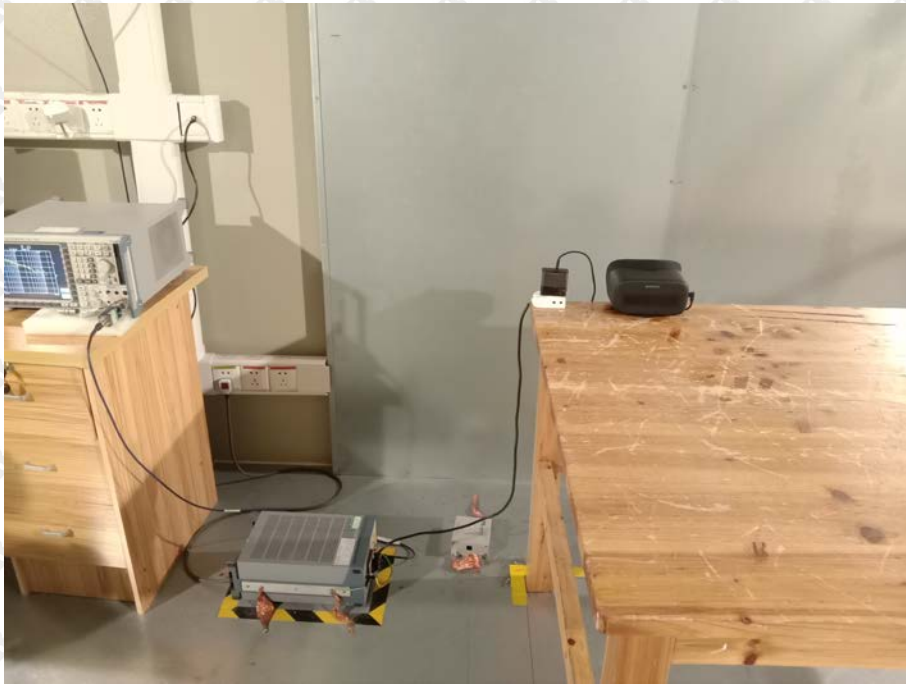
Below 1GHz



Above 1G



Conducted Emission



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