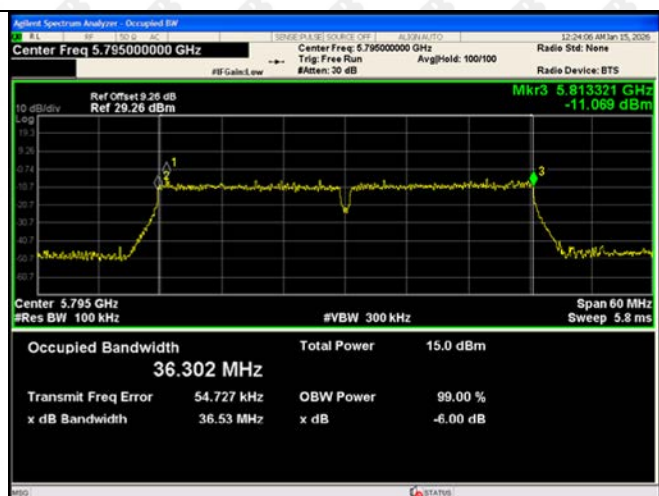




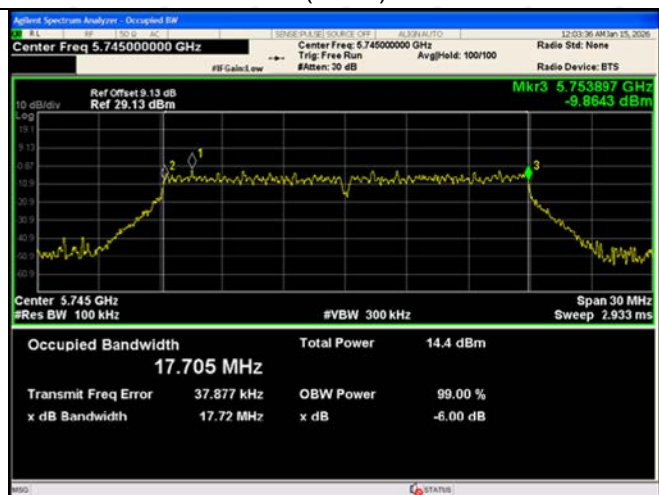
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802.11n(HT20)-5785



802.11n(HT20)-5825



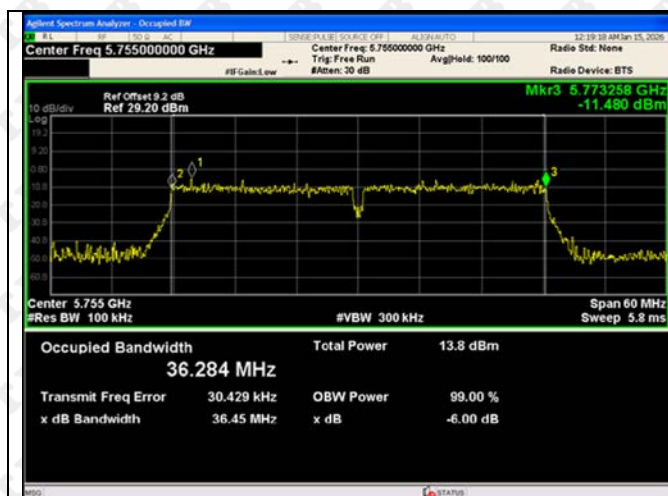
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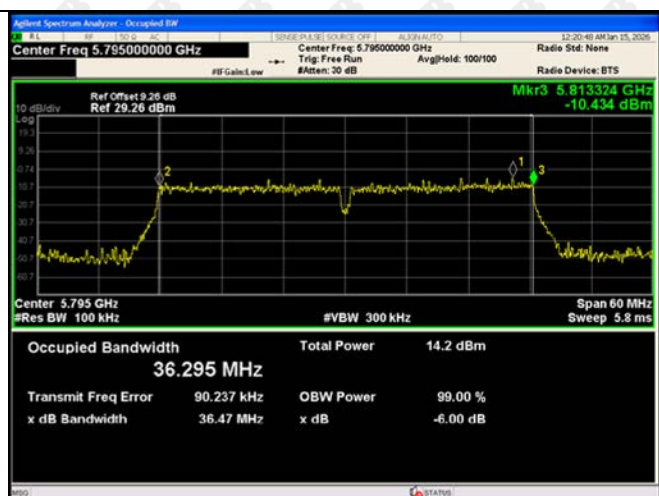
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802.11ax(HE20)-5745



802.11ax(HE20)-5785



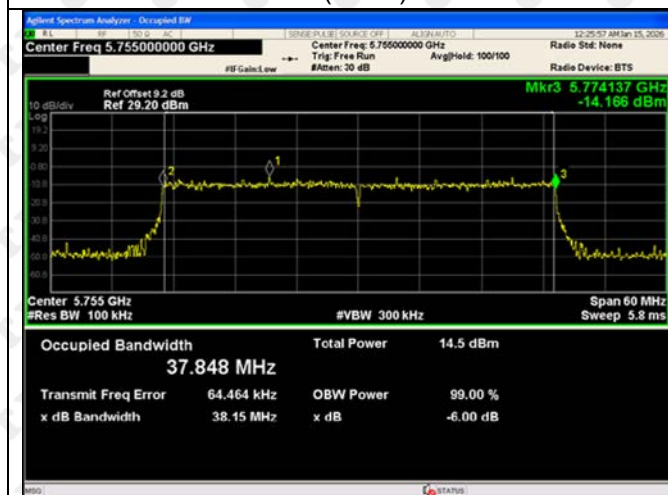
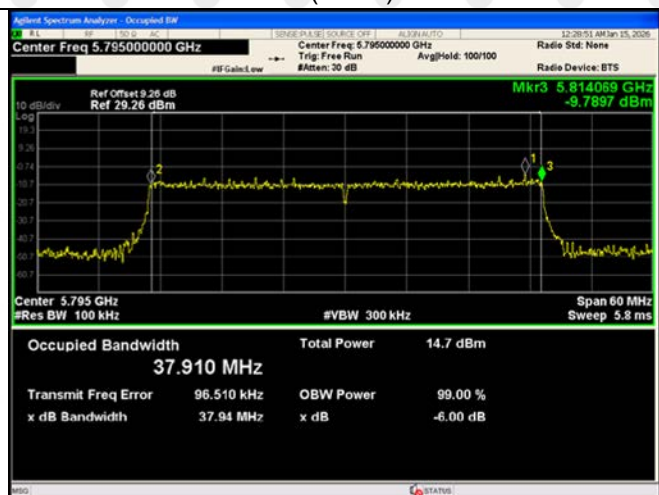
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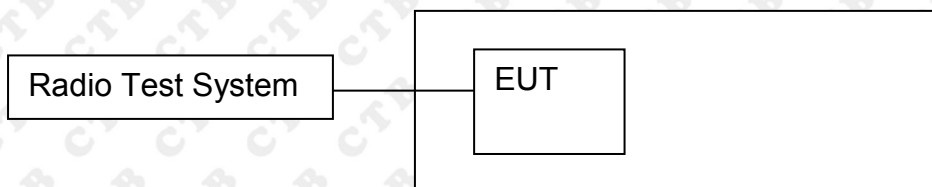


802.11ax(HE40)-5795



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 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:

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

b) Set $VBW \geq 3 RBW$.

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.

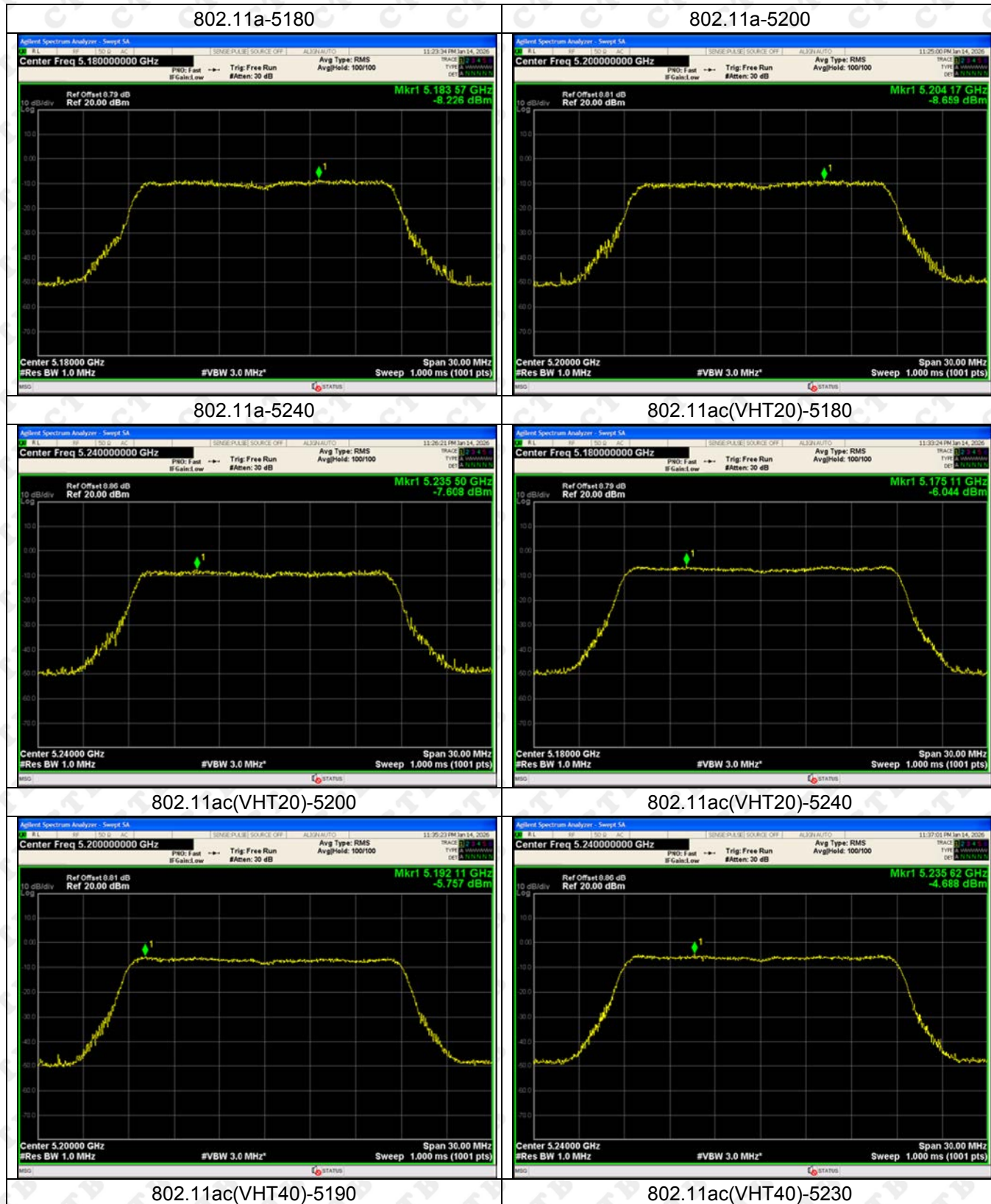
Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the II.F.5.c) and II.F.5.d), since $RBW=100 \text{ kHz}$ is available on nearly all spectrum analyzers.

11.4 Test Result

Test mode	Test Channel (MHz)	PSD [dBm/MHz]	Limit [dBm/MHz]	Result
802.11a	5180	-8.226	11	Pass
	5200	-8.659	11	Pass
	5240	-7.608	11	Pass
802.11ac(VHT20)	5180	-6.044	11	Pass
	5200	-5.757	11	Pass
	5240	-4.688	11	Pass
802.11ac(VHT40)	5190	-6.164	11	Pass
	5230	-8.156	11	Pass
802.11n(HT20)	5180	-7.721	11	Pass
	5200	-7.683	11	Pass
	5240	-6.938	11	Pass
802.11n(HT40)	5190	-12.278	11	Pass
	5230	-11.413	11	Pass
802.11ax(HE20)	5180	-6.096	11	Pass
	5200	-6.946	11	Pass
	5240	-5.53	11	Pass
802.11ax(HE40)	5190	-10.731	11	Pass
	5230	-10.173	11	Pass

Test mode	Test Channel (MHz)	PSD [dBm/500kHz]	Limit [dBm/MHz]	Result
802.11a	5745	-10.951	30	Pass
	5785	-10.56	30	Pass
	5825	-10.539	30	Pass
802.11ac(VHT20)	5745	-7.859	30	Pass
	5785	-8.319	30	Pass
	5825	-7.932	30	Pass
802.11ac(VHT40)	5755	-11.317	30	Pass
	5795	-11.207	30	Pass
802.11n(HT20)	5745	-10.493	30	Pass
	5785	-10.998	30	Pass
	5825	-10.594	30	Pass
802.11n(HT40)	5755	-16.527	30	Pass
	5795	-15.631	30	Pass
802.11ax(HE20)	5745	-8.775	30	Pass
	5785	-8.833	30	Pass
	5825	-8.907	30	Pass
802.11ax(HE40)	5755	-14.194	30	Pass
	5795	-13.34	30	Pass

5180-5240MHz





802.11n(HT20)-5180



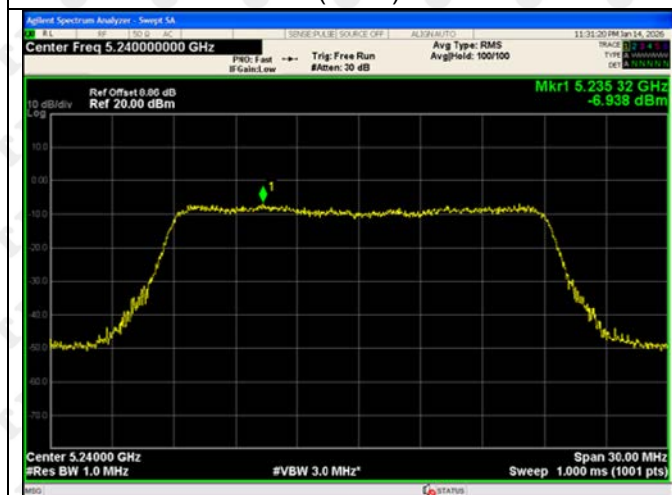
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802.11n(HT20)-5240



802.11n(HT40)-5190



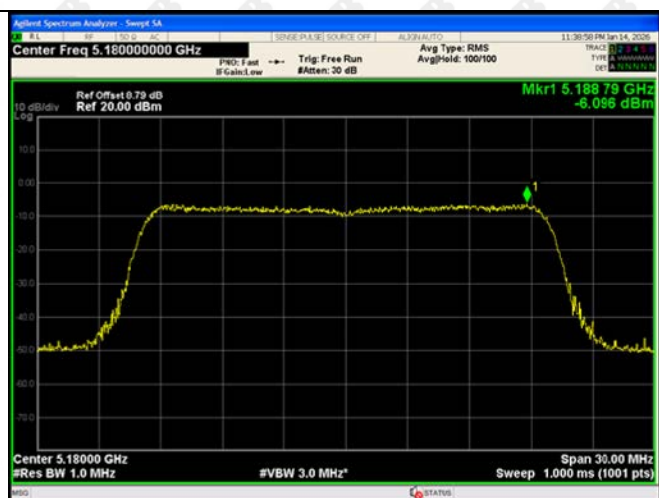
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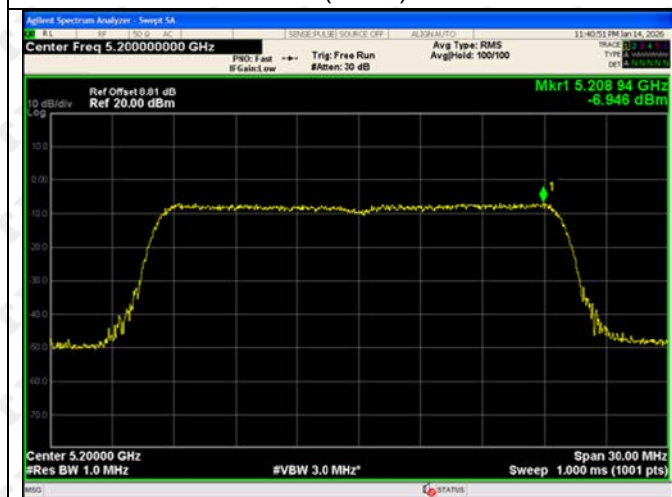
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802.11ax(HE20)-5200



802.11ax(HE20)-5240



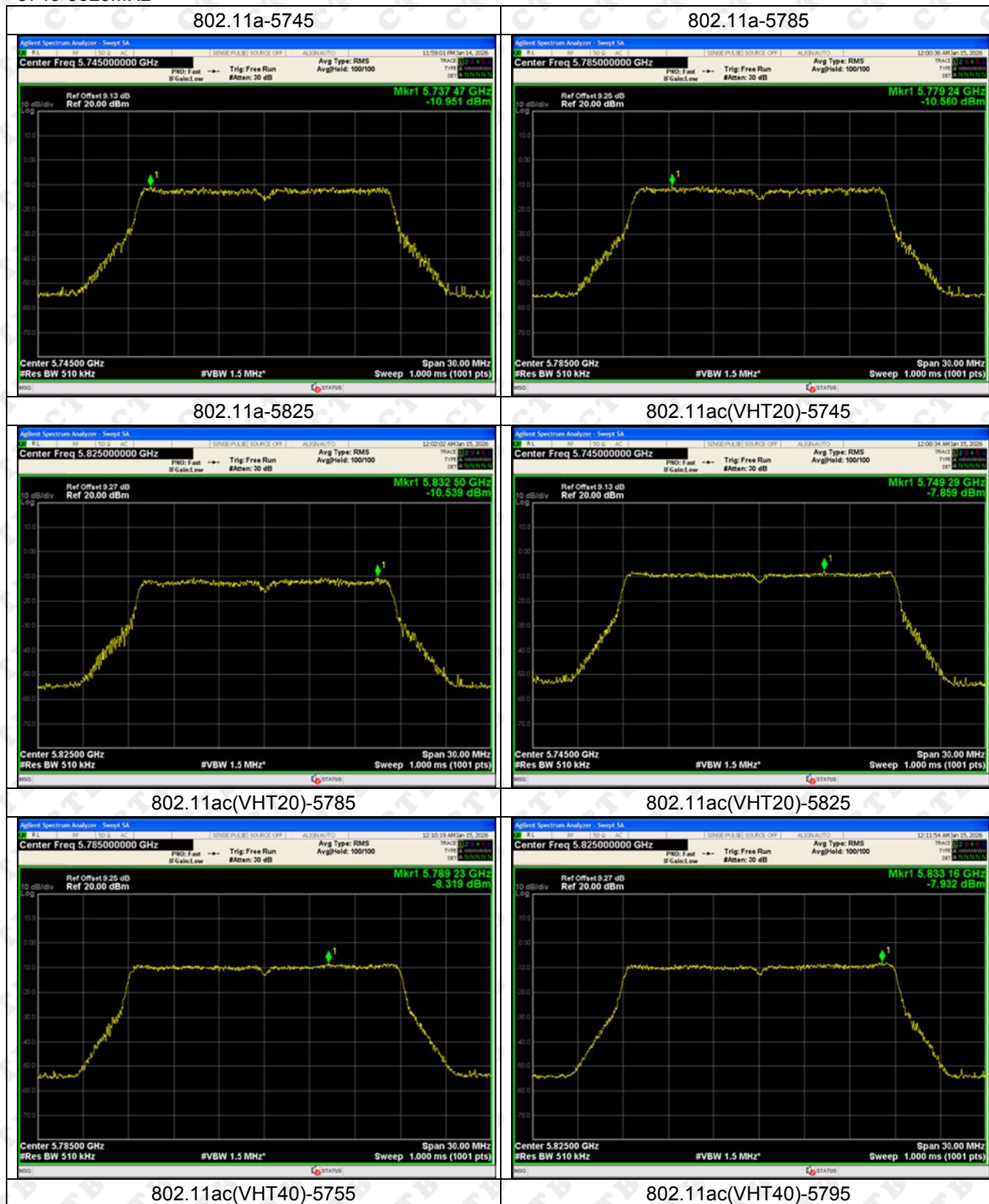
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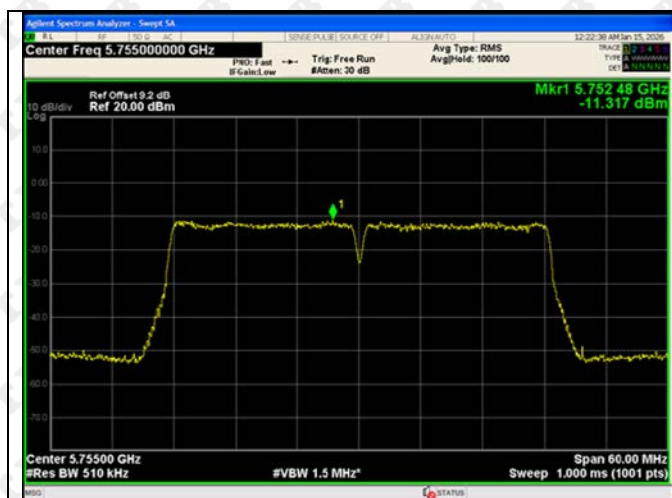


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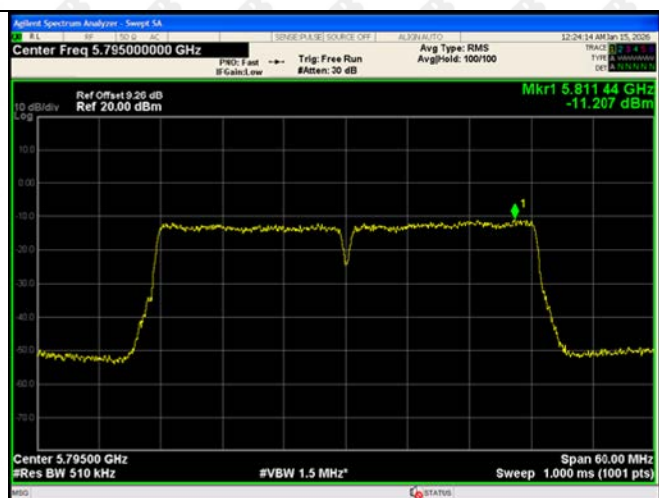


5745-5825MHz





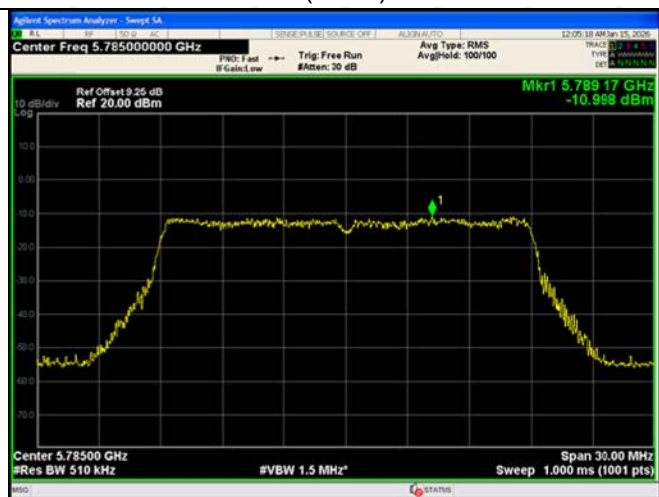
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802.11n(HT20)-5785



802.11n(HT20)-5825



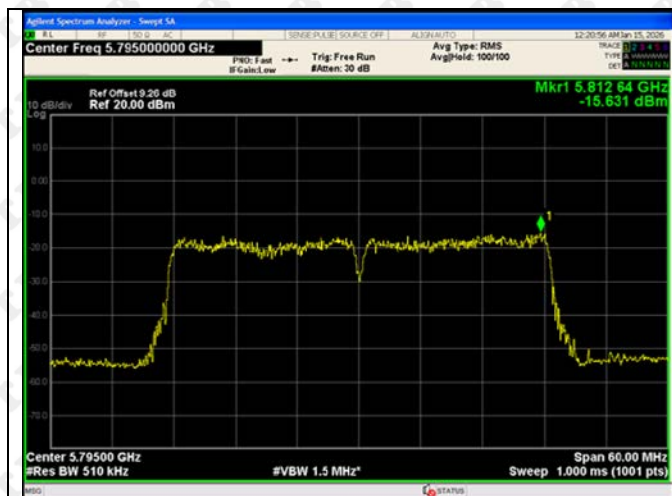
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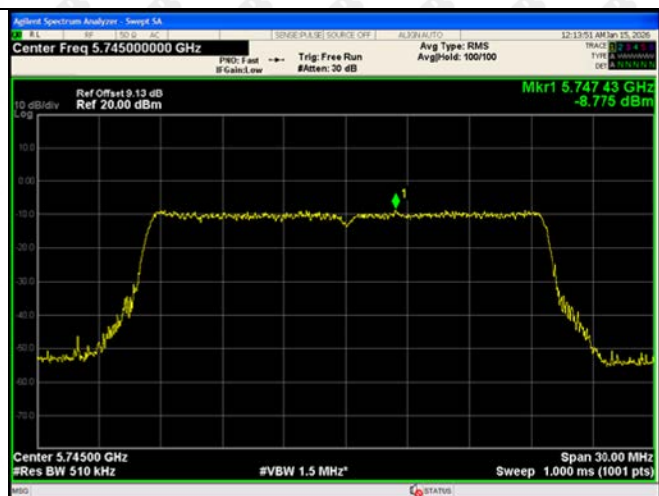
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802.11ax(HE20)-5745



802.11ax(HE20)-5785



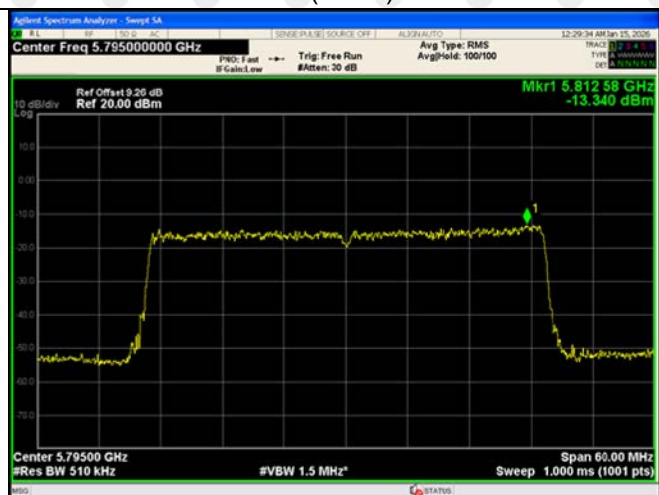
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802.11ax(HE40)-5755

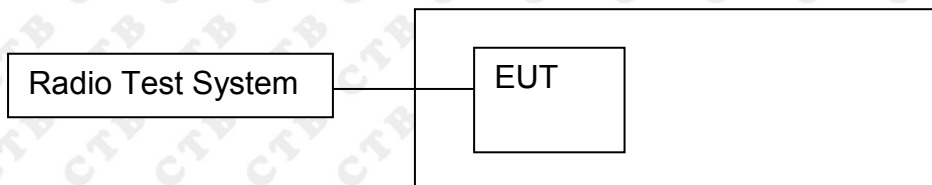


802.11ax(HE40)-5795



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)

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120	5180.0067	5180	0.0067	1.2878
		V max (V)	132	5180.0532	5180	0.0532	10.2743
		V min (V)	108	5180.0907	5180	0.0907	17.5139
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5180.0076	5180	0.0076	1.4735
		T (°C)	10	5180.0414	5180	0.0414	8.0018
		T (°C)	20	5180.0726	5180	0.0726	14.0191
		T (°C)	30	5180.0135	5180	0.0135	2.6149
		T (°C)	40	5180.0689	5180	0.0689	13.3028
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)	120	5200.0189	5200	0.0189	3.6429
		V max (V)	132	5200.0367	5200	0.0367	7.0653
		V min (V)	108	5200.0469	5200	0.0469	9.0237
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5200.0020	5200	0.0020	0.3880
		T (°C)	10	5200.0683	5200	0.0683	13.1393
		T (°C)	20	5200.0477	5200	0.0477	9.1681
		T (°C)	30	5200.0155	5200	0.0155	2.9782
		T (°C)	40	5200.0393	5200	0.0393	7.5571
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)	120	5240.0866	5240	0.0866	16.5206
		V max (V)	132	5240.0238	5240	0.0238	4.5368
		V min (V)	108	5240.0698	5240	0.0698	13.3222
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5240.0438	5240	0.0438	8.3523
		T (°C)	10	5240.0342	5240	0.0342	6.5173
		T (°C)	20	5240.0276	5240	0.0276	5.2723
		T (°C)	30	5240.0370	5240	0.0370	7.0623
		T (°C)	40	5240.0230	5240	0.0230	4.3974
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)	120	5745.0499	5745	0.0499	8.6900
		V max (V)	132	5745.0474	5745	0.0474	8.2448
		V min (V)	108	5745.0376	5745	0.0376	6.5513
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5745.0687	5745	0.0687	11.9587
		T (°C)	10	5745.0375	5745	0.0375	6.5349
		T (°C)	20	5745.0677	5745	0.0677	11.7894
		T (°C)	30	5745.0013	5745	0.0013	0.2235
		T (°C)	40	5745.0367	5745	0.0367	6.3874
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)	120	5785.0430	5785	0.0430	7.4311
		V max (V)	132	5785.0489	5785	0.0489	8.4563
		V min (V)	108	5785.0313	5785	0.0313	5.4054
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5785.0046	5785	0.0046	0.7985
		T (°C)	10	5785.0934	5785	0.0934	16.1432
		T (°C)	20	5785.0276	5785	0.0276	4.7795
		T (°C)	30	5785.0743	5785	0.0743	12.8466
		T (°C)	40	5785.0524	5785	0.0524	9.0665
		T (°C)	50	5785.0258	5785	0.0258	4.4653
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)	120	5825.0478	5825	0.0478	8.2138
		V max (V)	132	5825.0091	5825	0.0091	1.5563
		V min (V)	108	5825.0198	5825	0.0198	3.3942
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5825.0095	5825	0.0095	1.6356
		T (°C)	10	5825.0805	5825	0.0805	13.8148
		T (°C)	20	5825.0069	5825	0.0069	1.1818
		T (°C)	30	5825.0368	5825	0.0368	6.3197
		T (°C)	40	5825.0933	5825	0.0933	16.0227
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 link 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 WLAN message transmitting from remote device and verify whether it shall reconnect. (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.

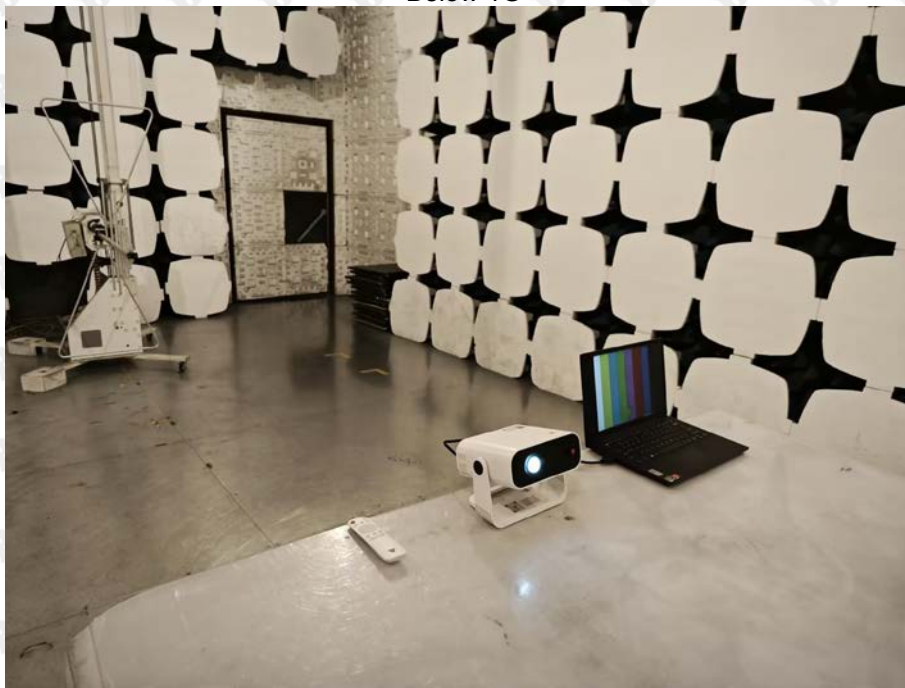
EUT Antenna:

The antenna is PCB antenna and no consideration of replacement. The best case gain of the antenna is WiFi (5.2G): 4.31dBi, WiFi (5.8G): 4.45dBi.

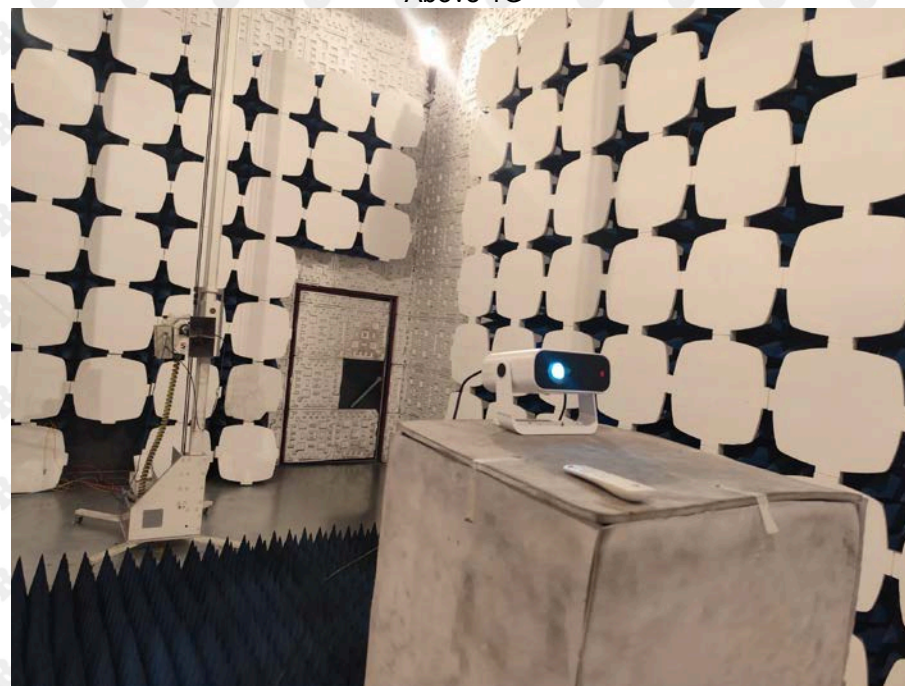
15. EUT TEST SETUP PHOTOGRAPHS

Radiated Emission

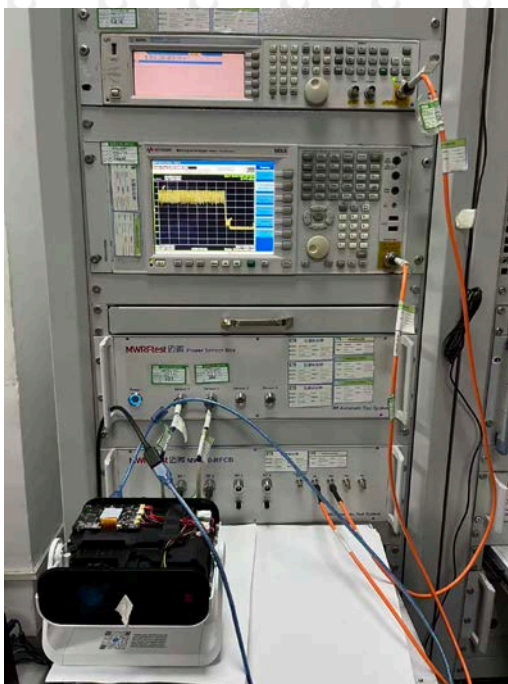
Below 1G



Above 1G



Conducted Emission



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