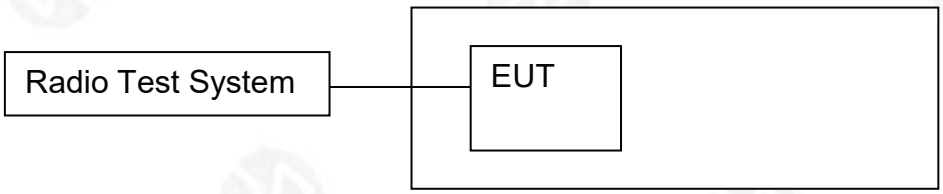
12. FREQUENCY STABILITY

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	5180.0174	5180	0.0174	3.3554
		V max (V)	132	5180.0405	5180	0.0405	7.8092
		V min (V)	108	5180.0194	5180	0.0194	3.7377
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	5180.0518	5180	0.0518	10.0054
		T (°C)	10	5180.0438	5180	0.0438	8.4499
		T (°C)	20	5180.0108	5180	0.0108	2.0903
		T (°C)	30	5180.0168	5180	0.0168	3.2402
		T (°C)	40	5180.0242	5180	0.0242	4.6784
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	5200.0142	5200	0.0142	2.7214
		V max (V)	132	5200.0463	5200	0.0463	8.8996
		V min (V)	108	5200.0352	5200	0.0352	6.7678
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	5200.0059	5200	0.0059	1.1291
		T (°C)	10	5200.0168	5200	0.0168	3.2308
		T (°C)	20	5200.0296	5200	0.0296	5.6874
		T (°C)	30	5200.0163	5200	0.0163	3.1318
		T (°C)	40	5200.0101	5200	0.0101	1.9350
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	5240.0281	5240	0.0281	5.3661
		V max (V)	132	5240.0314	5240	0.0314	5.9954
		V min (V)	108	5240.0015	5240	0.0015	0.2774
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	5240.0459	5240	0.0459	8.7654
		T (°C)	10	5240.0236	5240	0.0236	4.5021
		T (°C)	20	5240.0148	5240	0.0148	2.8265
		T (°C)	30	5240.0080	5240	0.0080	1.5348
		T (°C)	40	5240.0211	5240	0.0211	4.0323
Limits				±20ppm			
Result				Complies			

TX Frequency (5250-5350MHz)

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5260MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120	5260.0510	5260	0.0510	9.6897
		V max (V)	132	5260.0334	5260	0.0334	6.3591
		V min (V)	108	5260.0302	5260	0.0302	5.7508
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5260MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5260.0291	5260	0.0291	5.5291
		T (°C)	10	5260.0277	5260	0.0277	5.2616
		T (°C)	20	5260.0178	5260	0.0178	3.3767
		T (°C)	30	5260.0109	5260	0.0109	2.0812
		T (°C)	40	5260.0318	5260	0.0318	6.0414
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5280MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120	5280.0531	5280	0.0531	10.0595
		V max (V)	132	5280.0087	5280	0.0087	1.6439
		V min (V)	108	5280.0551	5280	0.0551	10.4356
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5280MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5280.0467	5280	0.0467	8.8502
		T (°C)	10	5280.0125	5280	0.0125	2.3698
		T (°C)	20	5280.0240	5280	0.0240	4.5427
		T (°C)	30	5280.0115	5280	0.0115	2.1833
		T (°C)	40	5280.0041	5280	0.0041	0.7713
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5320MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120	5320.0123	5320	0.0123	2.3207
		V max (V)	132	5320.0437	5320	0.0437	8.2120
		V min (V)	108	5320.0518	5320	0.0518	9.7435
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5320MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5320.0265	5320	0.0265	4.9764
		T (°C)	10	5320.0372	5320	0.0372	7.0001
		T (°C)	20	5320.0319	5320	0.0319	6.0007
		T (°C)	30	5320.0611	5320	0.0611	11.4858
		T (°C)	40	5320.0740	5320	0.0740	13.9129
Limits				±20ppm			
Result				Complies			

TX Frequency (5470-5725MHz)

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5500MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120	5550.0242	5500	50.0242	9095.3128
		V max (V)	132	5550.0869	5500	50.0869	9106.7029
		V min (V)	108	5550.0151	5500	50.0151	9093.6550
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5500MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5500.0761	5500	0.0761	13.8366
		T (°C)	10	5500.0934	5500	0.0934	16.9758
		T (°C)	20	5500.0803	5500	0.0803	14.6012
		T (°C)	30	5500.0158	5500	0.0158	2.8699
		T (°C)	40	5500.0895	5500	0.0895	16.2747
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5580MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120	5580.0785	5580	0.0785	14.0752
		V max (V)	132	5580.0199	5580	0.0199	3.5643
		V min (V)	108	5580.0458	5580	0.0458	8.2035
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5580MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5580.0029	5580	0.0029	0.5151
		T (°C)	10	5580.0301	5580	0.0301	5.3978
		T (°C)	20	5580.0342	5580	0.0342	6.1337
		T (°C)	30	5580.0917	5580	0.0917	16.4392
		T (°C)	40	5580.0154	5580	0.0154	2.7663
Limits				±20ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5700MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120	5700.0697	5700	0.0697	12.2289
		V max (V)	132	5700.0034	5700	0.0034	0.6052
		V min (V)	108	5700.0136	5700	0.0136	2.3873
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5700MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	120	T (°C)	0	5700.0398	5700	0.0398	6.9812
		T (°C)	10	5700.0579	5700	0.0579	10.1587
		T (°C)	20	5700.0258	5700	0.0258	4.5263
		T (°C)	30	5700.0321	5700	0.0321	5.6323
		T (°C)	40	5700.0239	5700	0.0239	4.1943
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	5745.0885	5745	0.0885	15.4046
		V max (V)	132	5745.0294	5745	0.0294	5.1242
		V min (V)	108	5745.0885	5745	0.0885	15.4046
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	5745.0127	5745	0.0127	2.2150
		T (°C)	10	5745.0699	5745	0.0699	12.1695
		T (°C)	20	5745.0775	5745	0.0775	13.4968
		T (°C)	30	5745.0679	5745	0.0679	11.8136
		T (°C)	40	5745.0272	5745	0.0272	4.7343
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	5785.0058	5785	0.0058	1.0005
		V max (V)	132	5785.0323	5785	0.0323	5.5918
		V min (V)	108	5785.0558	5785	0.0558	9.6510
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	5785.0890	5785	0.0890	15.3829
		T (°C)	10	5785.0152	5785	0.0152	2.6340
		T (°C)	20	5785.0817	5785	0.0817	14.1299
		T (°C)	30	5785.0148	5785	0.0148	2.5621
		T (°C)	40	5785.0417	5785	0.0417	7.2037
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	5825.0296	5825	0.0296	5.0815
		V max (V)	132	5825.0660	5825	0.0660	11.3276
		V min (V)	108	5825.0783	5825	0.0783	13.4495
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	5825.0097	5825	0.0097	1.6688
		T (°C)	10	5825.0111	5825	0.0111	1.9008
		T (°C)	20	5825.0737	5825	0.0737	12.6544
		T (°C)	30	5825.0790	5825	0.0790	13.5604
		T (°C)	40	5825.0750	5825	0.0750	12.8757
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. DUTY CYCLE

14.1 Applied procedures / limit

Measurements of duty cycle and transmission duration shall be performed using one of the following techniques:

a) A diode detector and an oscilloscope that together have a sufficiently short response time to permit accurate measurements of the ON and OFF times of the transmitted signal.

b) The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the ON and OFF times of the transmitted signal:

1) Set the center frequency of the instrument to the center frequency of the transmission.

2) Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value.

3) Set VBW ≥ RBW. Set detector = peak or average.

4) The zero-span measurement method shall not be used unless both RBW and VBW are > 50/*T* and the number of sweep points across duration *T* exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring the duty cycle shall not be used if $T \leq 16.7$ µs.)

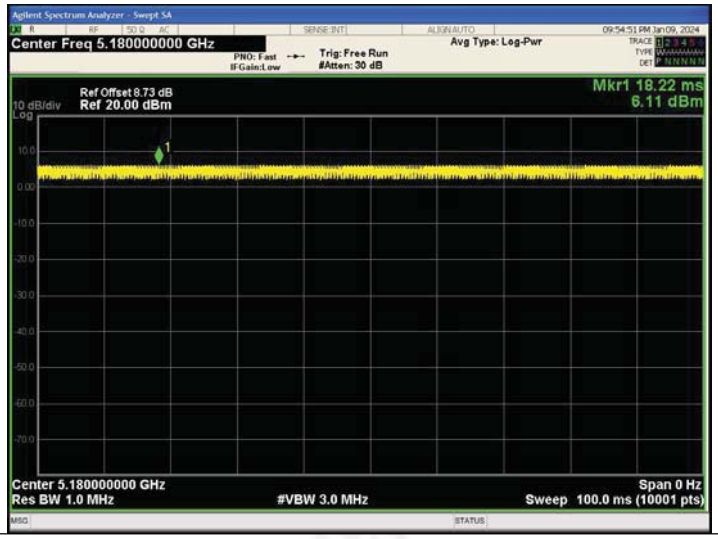
14.2 DEVIATION FROM STANDARD

No deviation.

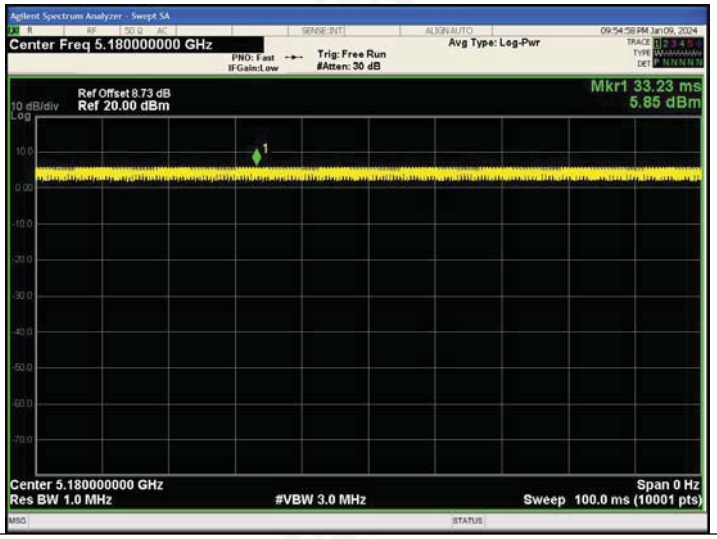
14.3 TEST SETUP

5.2G				
Mode	Frequency (MHz)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Result
802.11a	5180	100	6.11	Pass
802.11n20	5180	100	5.85	Pass
802.11n40	5190	100	2.42	Pass
802.11ac20	5180	100	5.74	Pass
802.11ac40	5190	100	2.12	Pass
802.11ax0	5180	100	5.64	Pass
802.11ax0	5190	100	2.01	Pass

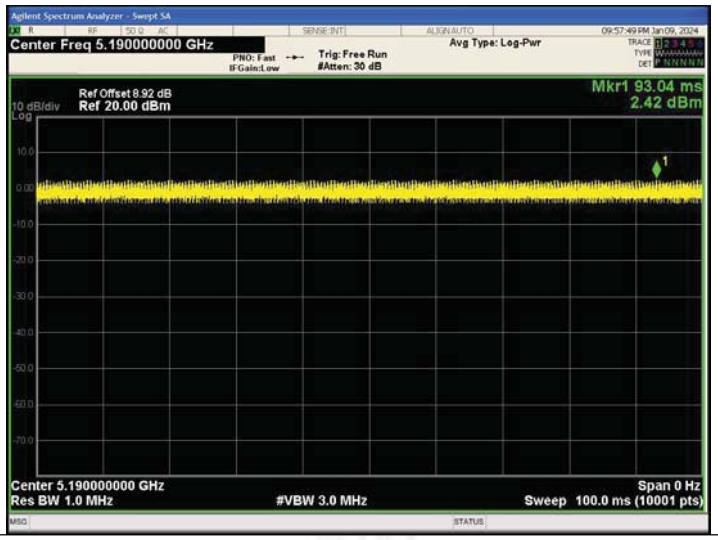
802.11a



802.11n20



802.11n40



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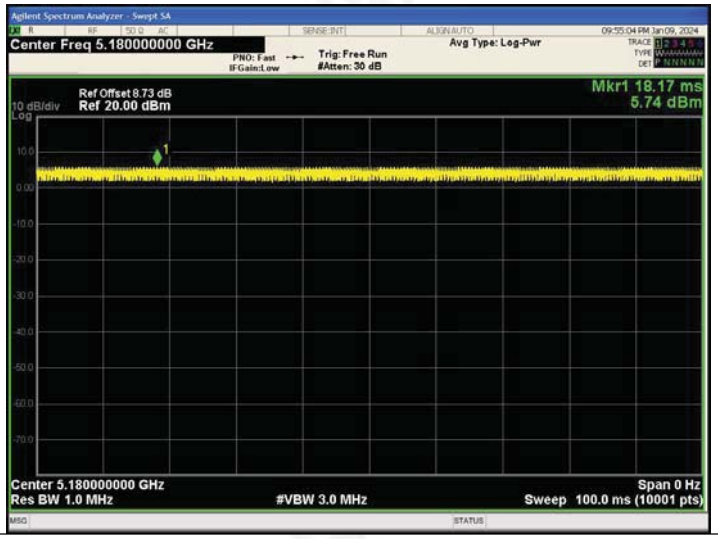

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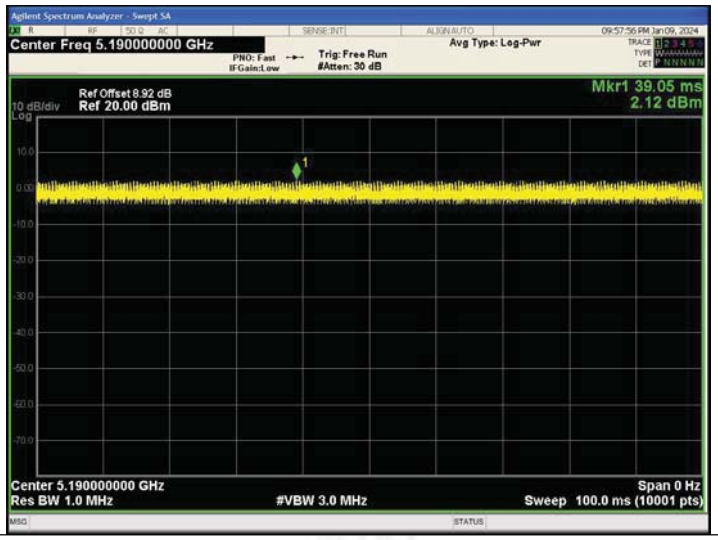

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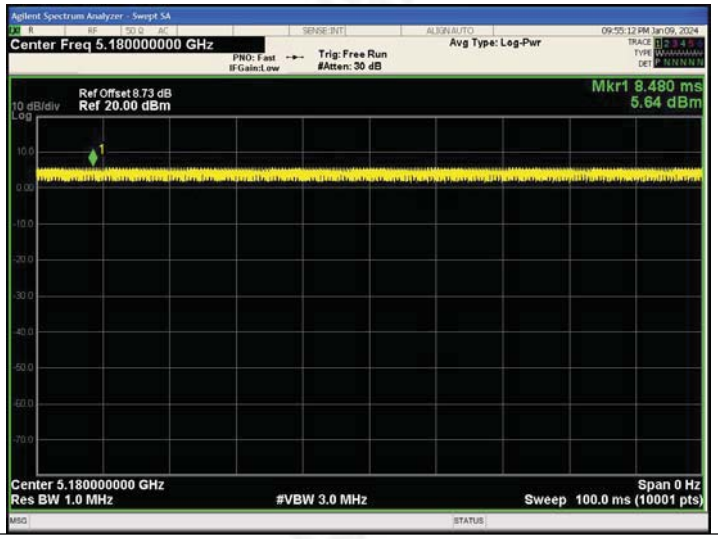
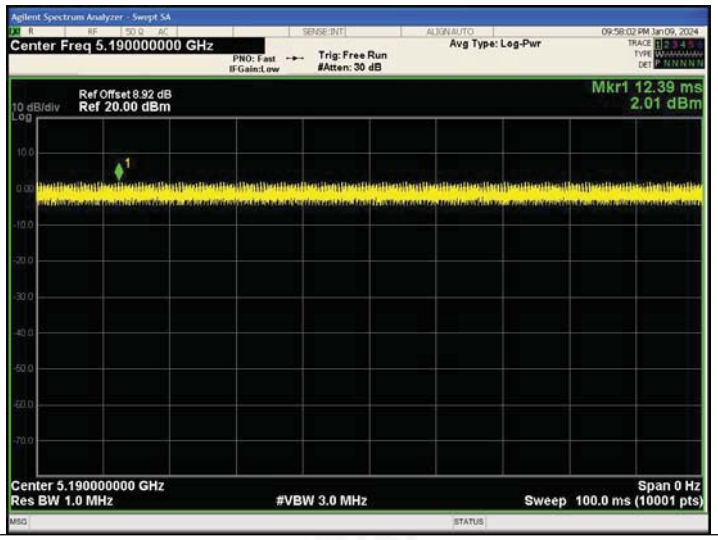


802.11ax40



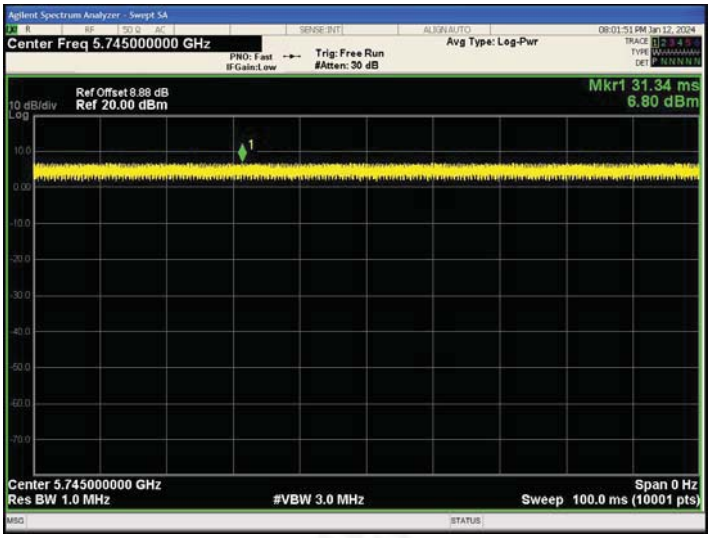
Note: All channel have been tested, and the report only reflects the worst case data.

Duty Cycle= Ton /Total*100%

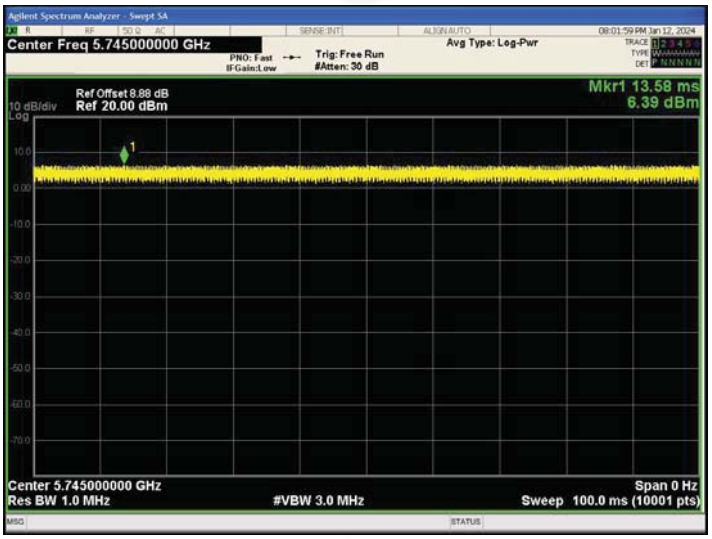
Duty Cycle Correction Factor = 10log (1/Duty Cycle)

5.8G				
Mode	Frequency (MHz)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Result
802.11a	5745	100	6.80	Pass
802.11n20	5745	100	6.39	Pass
802.11n40	5755	100	1.96	Pass
802.11ac20	5745	100	1.96	Pass
802.11ac40	5755	100	1.61	Pass
802.11ax20	5745	100	5.98	Pass
802.11ax40	5755	100	1.5	Pass

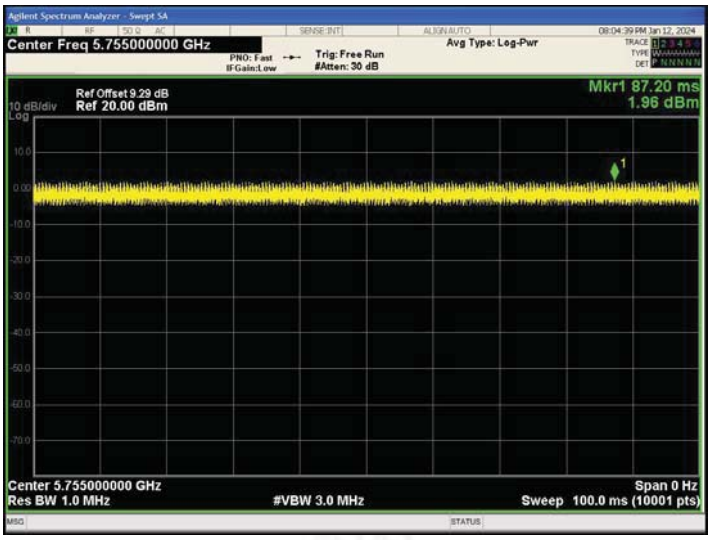
802.11a



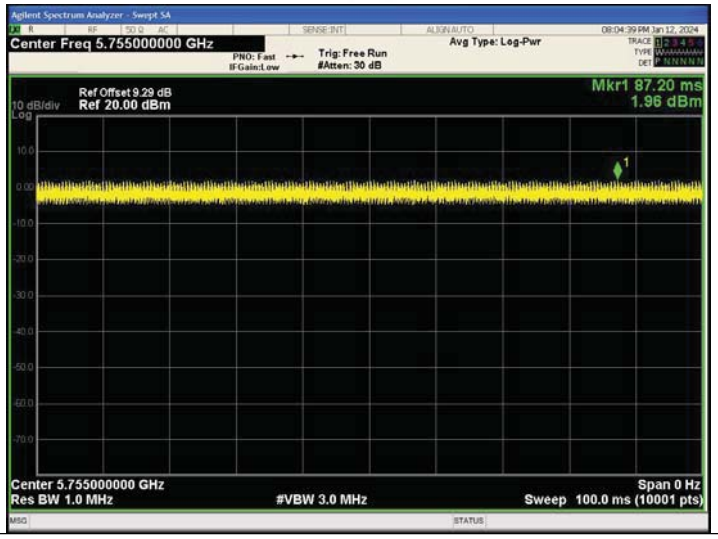
802.11n20



802.11n40



802.11ac20



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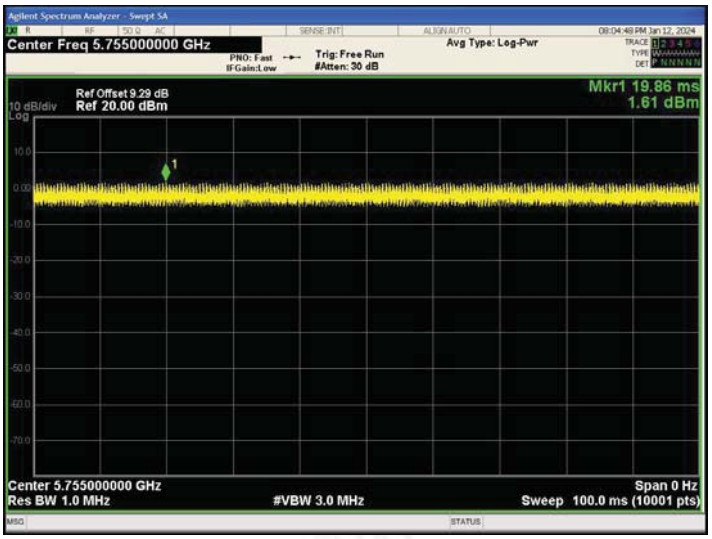

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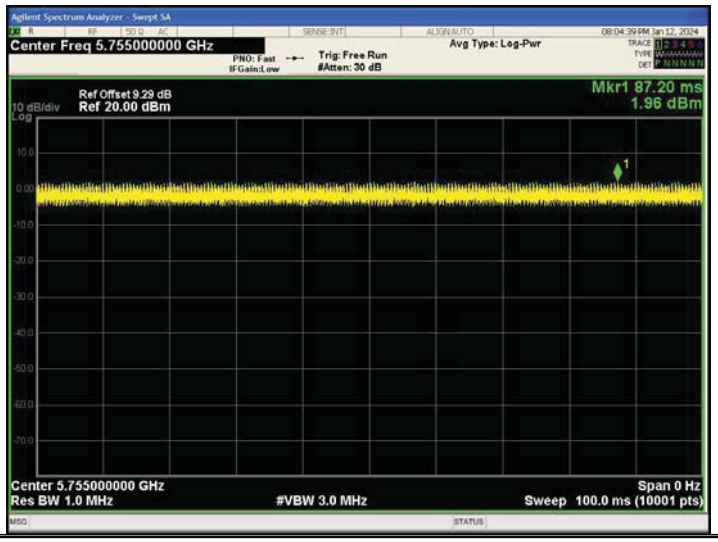

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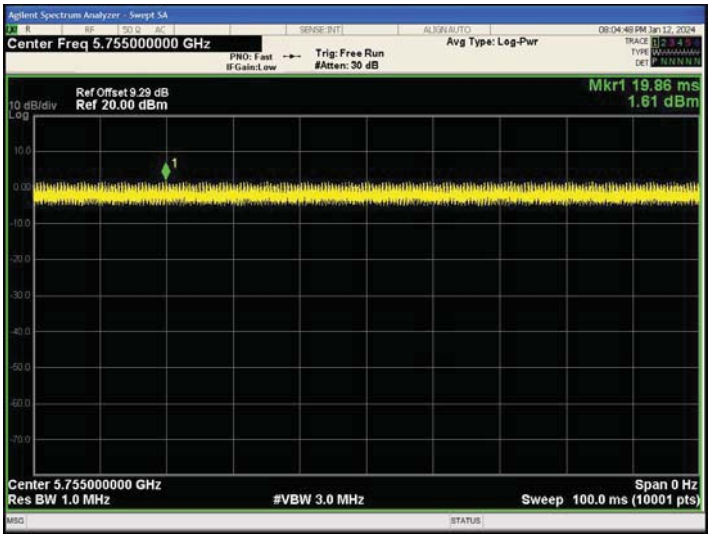
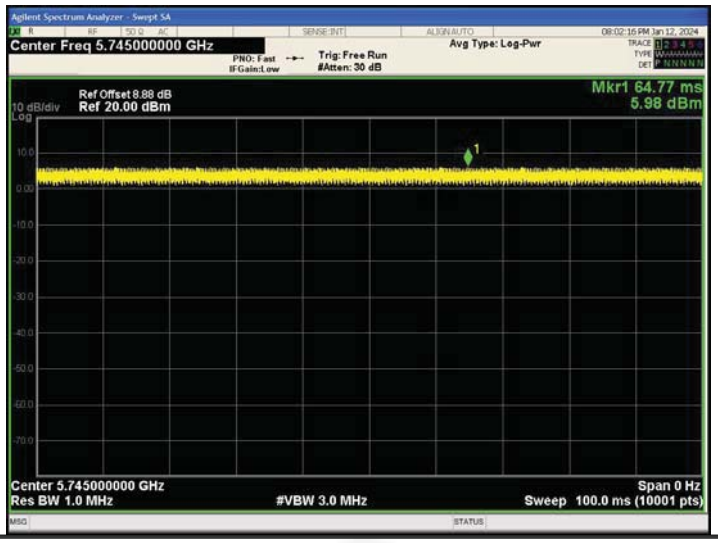
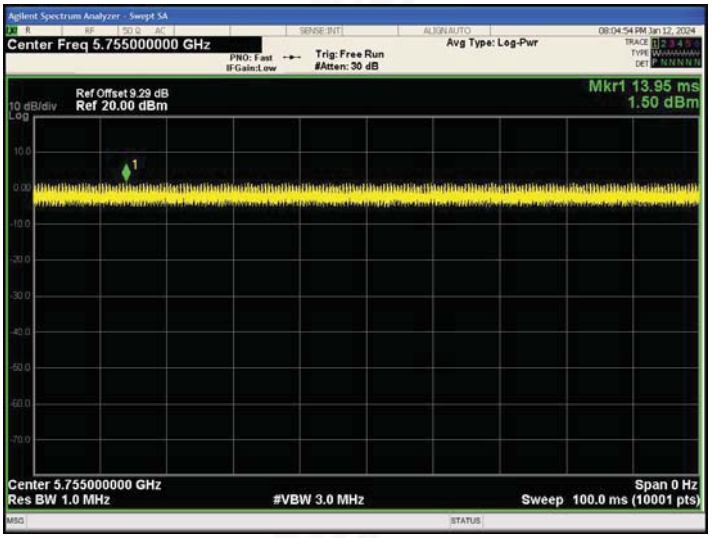


802.11ax20



802.11ax40



Note: All channel have been tested, and the report only reflects the worst case data.

Duty Cycle= Ton /Total*100%

Duty Cycle Correction Factor = 10log (1/Duty Cycle)

15. 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 is3.0dBi.

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