



5. POWER SPECTRAL DENSITY TEST

5.1 APPLIED PROCEDURES / LIMIT

In addition, the maximum power spectral density shall not exceed 30 dBm in any 500 kHz band.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	= the frequency band of operation
RB	$RBW \geq 510\text{KHz}$ for band 4
VB	$VBW \geq 3RBW$
Detector	Average
Trace	Max Hold
Sweep Time	Auto

5.1.1 TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
4. For U-NII1, U-NII-2A, U-NII-2C Band:
Set $RBW=1\text{MHz}$, $VBW=3\text{MHz}$, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
For U-NII-3 Band:
Set $RBW=510\text{ kHz}$, $VBW=3*RBW$, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)
5. Use the cursor on spectrum to peak search the highest level of trace
6. Record the max. reading and add $10 \log(1/\text{duty cycle})$.
we test all antennas, the antenna 1 was worst mode and the data recording in the report.
7. Duty factor Reference is made to the test results in Section 7.1.5.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

**5.1.5 TEST RESULTS**

Band	Mode	Test Channel	Read Level (dBm)		Duty Fator (dB)	PSD (dBm/500kHz)			LIMIT (dBm)
			Ant1	Ant2		Ant1	Ant2	MIMO	
Band 4	802.11a	Low	3.470	2.947	0.14	3.610	3.087	/	24
		Moddle	3.575	2.602	0.13	3.705	2.732	/	24
		High	2.272	2.839	0.13	2.402	2.969	/	24
	802.11ac HT20	Low	0.815	1.69	0.82	1.635	2.510	5.10	21
		Moddle	1.735	0.291	0.86	2.595	1.151	4.94	21
		High	1.949	0.062	0.77	2.719	0.832	4.89	21
	802.11ac HT40	Low	-3.197	-2.596	0.28	-2.917	-2.316	0.40	21
		High	-2.116	-2.623	0.3	-1.816	-2.323	0.95	21
	802.11n HT20	Low	-0.192	2.459	0.14	-0.052	2.599	4.48	21
		Moddle	0.652	2.622	0.14	0.792	2.762	4.90	21
		High	0.492	2.957	0.14	0.632	3.097	5.05	21
	802.11n HT40	Low	-2.639	-1.203	0.27	-2.369	-0.933	0.503	21
		High	-1.869	-1.233	0.27	-1.599	-0.963	0.301	21



ANT1

802.11a



802.11n HT20



5745MHz



5745MHz



5785MHz



5785MHz



5825MHz

5825MHz



802.11n HT40



802.11ac HT20



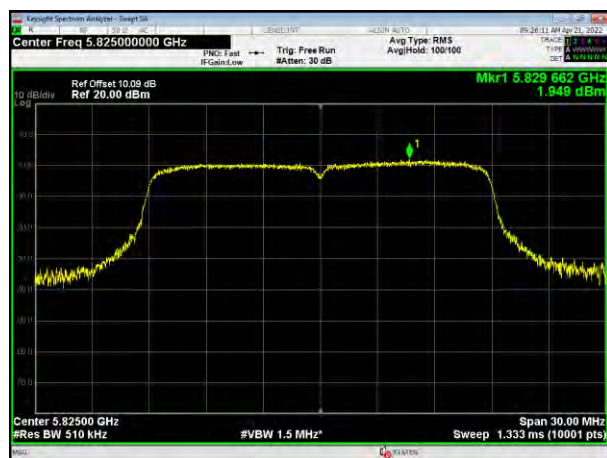
5755MHz



5745MHz



5795MHz



5785MHz

5825MHz



802.11ac HT40



5755MHz



5795MHz



ANT2

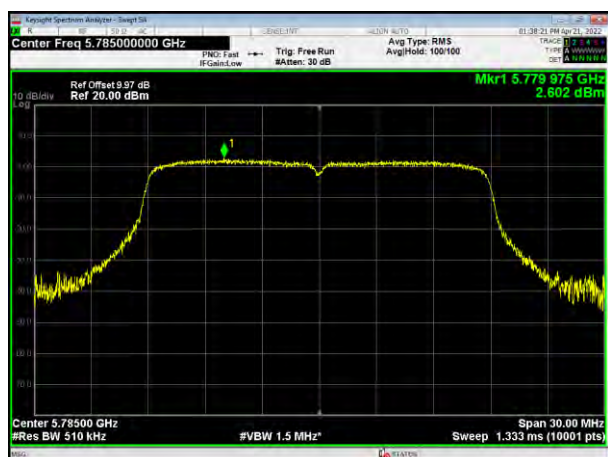
802.11a



802.11n HT20



5745MHz



5745MHz



5785MHz



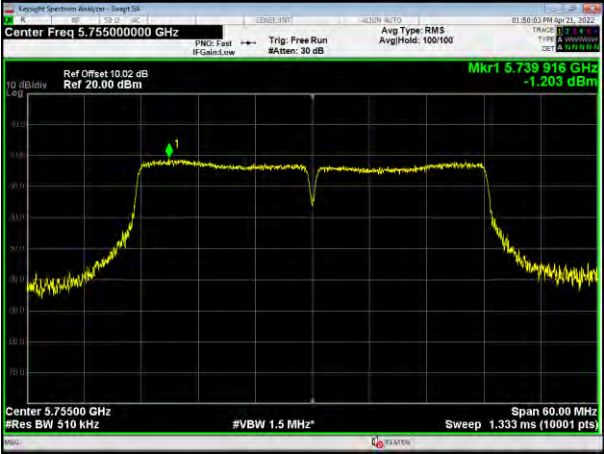
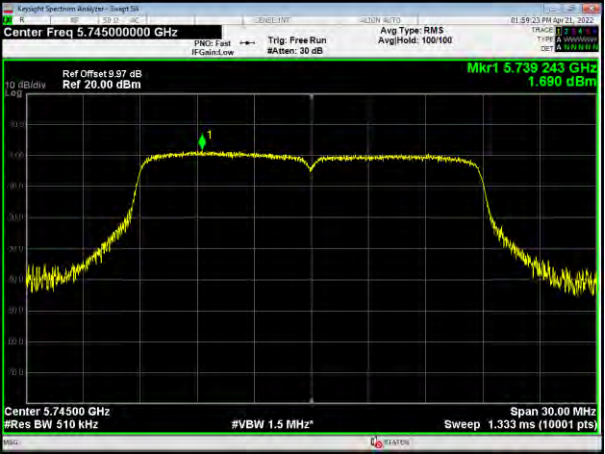
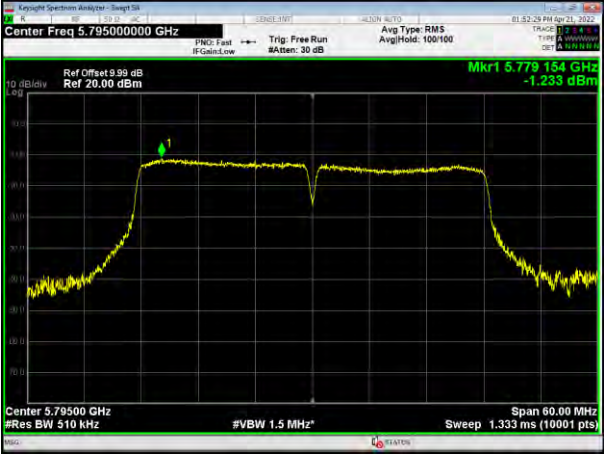
5785MHz



5825MHz

5825MHz



802.11n HT40 	802.11ac HT20 
5755MHz 	5745MHz 
5795MHz 	5785MHz 
	5825MHz



802.11ac HT40



5755MHz



5795MHz



6. 6DB&99% BANDWIDTH TEST

6.1 APPLIED PROCEDURES / LIMIT

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C.

The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3

6.1.1 TEST PROCEDURE

6dB Bandwidth	
Spectrum Parameters	Setting
RBW	100KHz
VBW	300KHz
Span	30MHz(20MHz Bandwidth mode) 60MHz(40MHz Bandwidth mode) 120MHz(80MHz Bandwidth mode)
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

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

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

6.1.5 TEST RESULTS



		Test Channel	6dB Bandwidth (MHz)		6dB Bandwidth Limit (MHz)	Result
			ANT1	ANT2		
Band 4	802.11a	Low	15.90	17.28	>0.5	Pass
		Middle	16.27	16.75	>0.5	Pass
		High	16.29	16.40	>0.5	Pass
	802.11ac HT20	Low	16.01	16.44	>0.5	Pass
		Middle	16.30	17.05	>0.5	Pass
		High	16.24	16.65	>0.5	Pass
	802.11ac HT40	Low	36.27	36.29	>0.5	Pass
		High	35.41	34.25	>0.5	Pass
	802.11n HT20	Low	16.66	16.94	>0.5	Pass
		Middle	16.57	16.67	>0.5	Pass
		High	16.70	16.92	>0.5	Pass
	802.11n HT40	Low	36.08	36.04	>0.5	Pass
		High	35.47	35.70	>0.5	Pass

		Test Channel	99% Bandwidth (MHz)		Result
			ANT1	ANT2	
Band 4	802.11a	Low	17.715	17.632	Pass
		Middle	17.639	17.582	Pass
		High	17.656	17.631	Pass
	802.11ac HT20	Low	17.625	17.615	Pass
		Middle	17.609	17.554	Pass
		High	17.609	17.595	Pass
	802.11ac HT40	Low	36.608	36.550	Pass
		High	36.397	36.400	Pass
	802.11n HT20	Low	17.536	17.545	Pass
		Middle	17.507	17.524	Pass
		High	17.523	17.547	Pass
	802.11n HT40	Low	36.640	36.585	Pass
		High	36.510	36.443	Pass



ANT1

6DB BANDWIDTH

802.11a



802.11n HT20



5745MHz



5745MHz



5785MHz



5785MHz



5825MHz

5825MHz



802.11n HT40



802.11ac HT20



5755MHz



5745MHz



5795MHz



5785MHz



5825MHz



802.11ac HT40



5755MHz



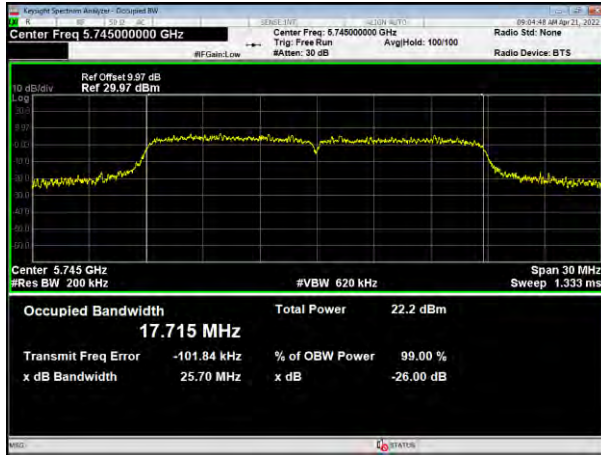
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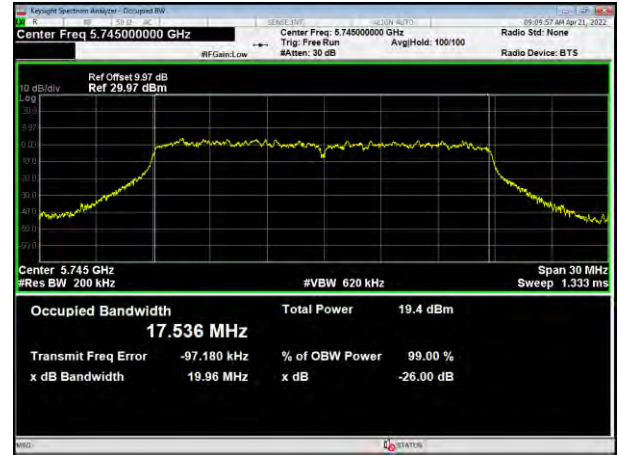
ANT1

99% BANDWIDTH

802.11a



802.11n HT20



5745MHz



5745MHz



5785MHz



5785MHz



5825MHz

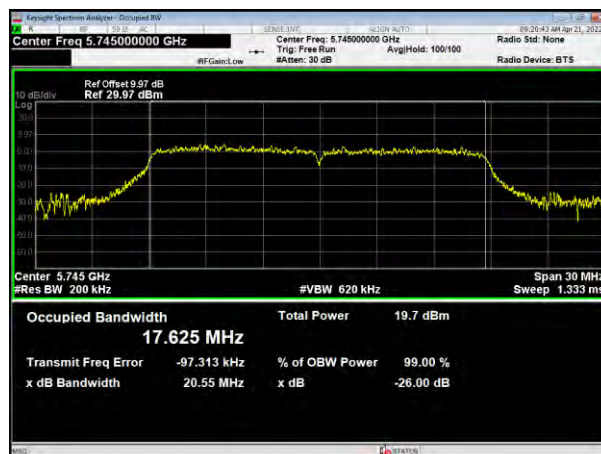
5825MHz



802.11n HT40



802.11ac HT20



5755MHz



5745MHz



5795MHz



5785MHz



5825MHz



802.11ac HT40



5755MHz



5795MHz

ANT2
6DB BANDWIDTH

802.11a



802.11n HT20



5745MHz



5745MHz



5785MHz



5785MHz

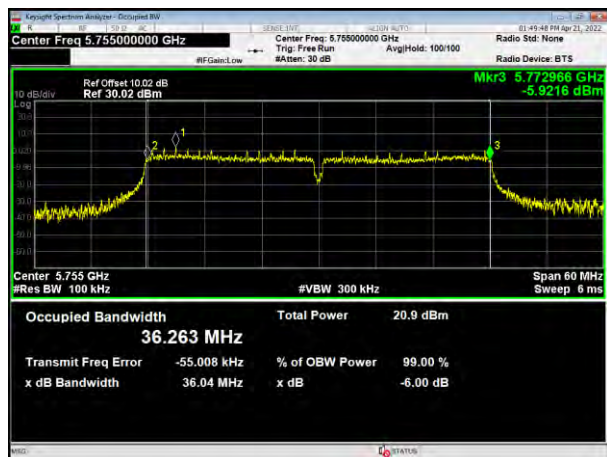


5825MHz

5825MHz



802.11n HT40



802.11ac HT20



5755MHz



5745MHz



5795MHz



5785MHz

5825MHz



802.11ac HT40



5755MHz



5795MHz

**ANT2**
99% BANDWIDTH

802.11a



802.11n HT20



5745MHz



5745MHz



5785MHz



5785MHz



5825MHz

5825MHz



802.11n HT40



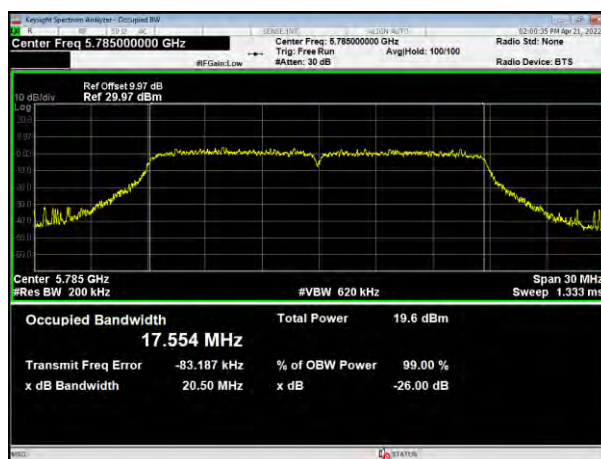
802.11ac HT20



5755MHz



5745MHz



5795MHz



5785MHz



5825MHz



802.11ac HT40



5755MHz



5795MHz



7. DUTY CYCLE TEST SIGNAL

7.1 APPLIED PROCEDURES / LIMIT

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle. All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

7.1.1 TEST PROCEDURE

1. Set RBW = 1 MHz.
2. Set the video bandwidth (VBW) $\geq$ RBW.
3. Detector = Peak.
4. Sweep = auto couple.
5. Allow the trace to stabilize.
6. Span=0

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



7.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

**7.1.5 TEST RESULTS**

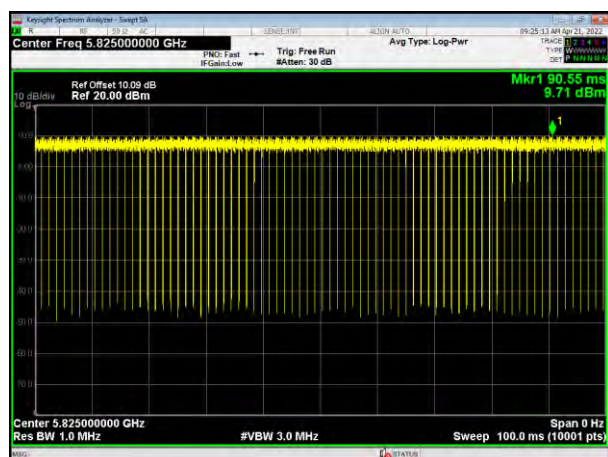
Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)
a	5745	96.84	0.14
a	5785	96.96	0.13
a	5825	97.00	0.13
ac20	5745	96.9	0.14
ac20	5785	96.92	0.14
ac20	5825	96.91	0.14
ac40	5755	94.03	0.27
ac40	5795	94.07	0.27
n20	5745	82.82	0.82
n20	5785	82.11	0.86
n20	5825	83.68	0.77
n40	5755	93.71	0.28
n40	5795	93.43	0.3



802.11a



802.11ac 20

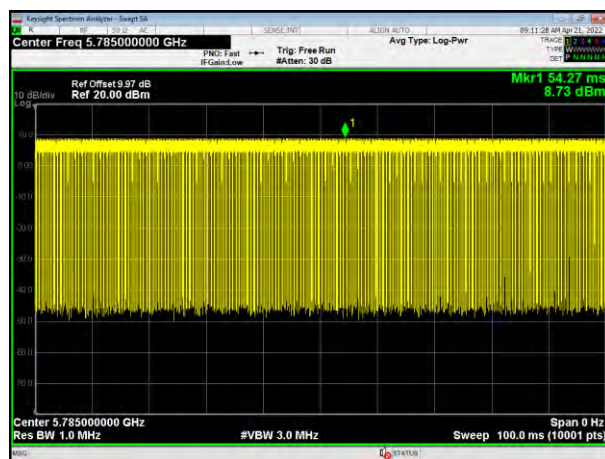
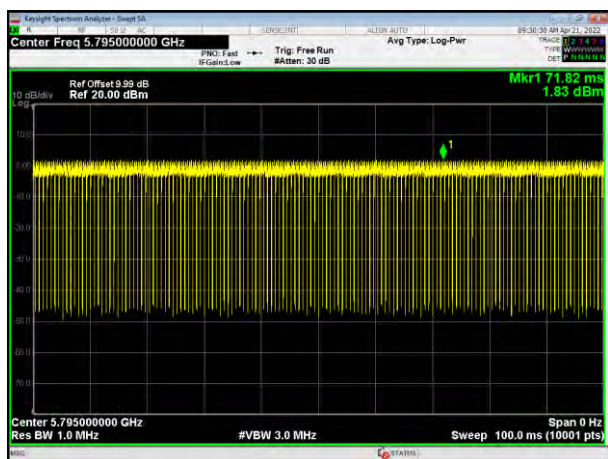
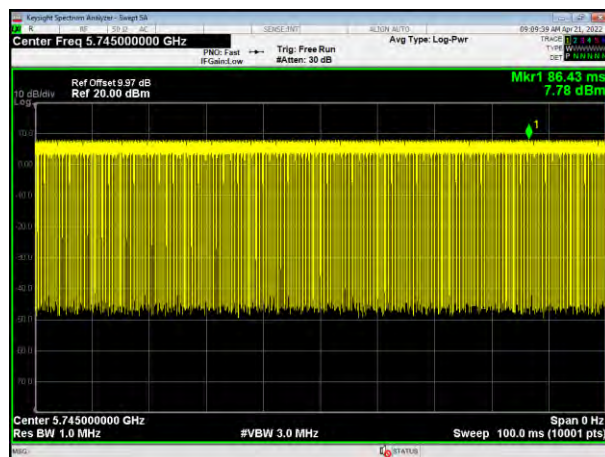




802.11ac 40

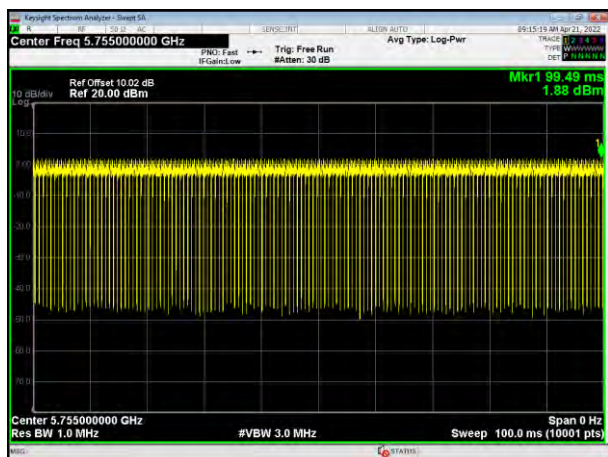


802.11n 20





802.11n40





8. FREQUENCY STABILITY

8.1 APPLIED PROCEDURES / 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.

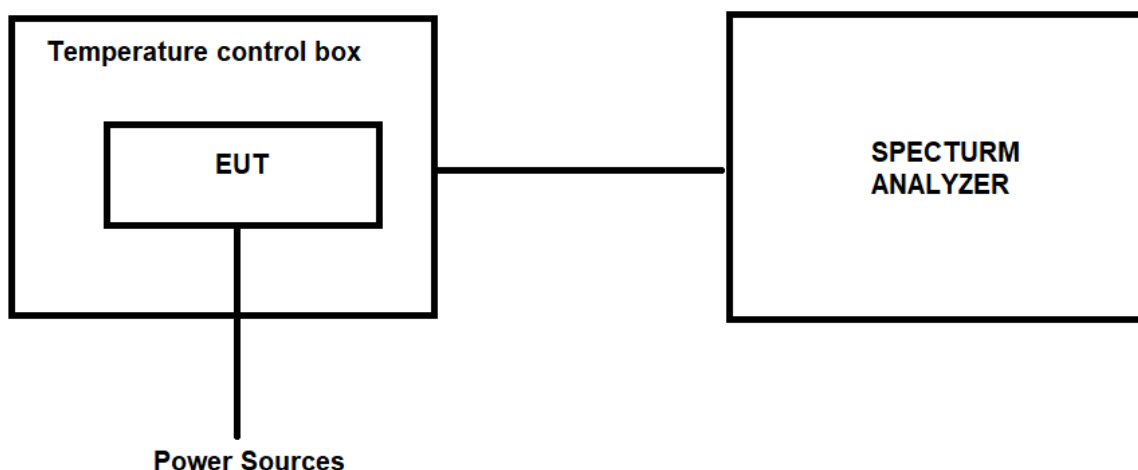
8.1.1 TEST PROCEDURE

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.

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



8.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

**8.1.5 TEST RESULTS**

ANT1

Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)			Δ Frequency (MHz)		
			802.11a	802.11n HT20	802.11ac HT20	802.11a	802.11n HT20	802.11ac HT20
26.4V	-20℃	5745	5745.0296	5745.0285	5745.0312	-0.0296	-0.0285	-0.0312
		5785	5785.0284	5785.0296	5785.0285	-0.0284	-0.0296	-0.0285
		5825	5825.0264	5825.0273	5825.0300	-0.0264	-0.0273	-0.0300
21.6V		5745	5745.0235	5745.0216	5745.0193	-0.0235	-0.0216	-0.0193
		5785	5785.0286	5785.0288	5785.0288	-0.0286	-0.0288	-0.0288
		5825	5825.0414	5825.0373	5825.0430	-0.0414	-0.0373	-0.0430
24.0V	25℃	5745	5745.0274	5745.0323	5745.0325	-0.0274	-0.0323	-0.0325
		5785	5785.0401	5785.0418	5785.0446	-0.0401	-0.0418	-0.0446
		5825	5825.0195	5825.0195	5825.0177	-0.0195	-0.0195	-0.0177
26.4V	50℃	5745	5745.0584	5745.0587	5745.0622	-0.0584	-0.0587	-0.0622
		5785	5785.0418	5785.0404	5785.0414	-0.0418	-0.0404	-0.0414
		5825	5825.0614	5825.0575	5825.0617	-0.0614	-0.0575	-0.0617
21.6V	50℃	5745	5745.0374	5745.0384	5745.0445	-0.0374	-0.0384	-0.0445
		5785	5785.0222	5785.0196	5785.0222	-0.0222	-0.0196	-0.0222
		5825	5825.0673	5825.0673	5825.0672	-0.0673	-0.0673	-0.0672

Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)		Δ Frequency (MHz)	
			802.11n HT40	802.11ac HT40	802.11n HT40	802.11ac HT40
26.4V	-20℃	5755	5755.0476	5755.0474	-0.0476	-0.0474
		5795	5795.0613	5795.0615	-0.0613	-0.0615
21.6V		5755	5755.0205	5755.0582	-0.0205	-0.0582
		5795	5795.0446	5795.0422	-0.0446	-0.0422
24.0V	25℃	5755	5755.0226	5755.0184	-0.0226	-0.0184
		5795	5795.0511	5795.0486	-0.0511	-0.0486
26.4V	50℃	5755	5755.0425	5755.0405	-0.0425	-0.0405
		5795	5795.0293	5795.0293	-0.0293	-0.0293
21.6V	50℃	5755	5755.0345	5755.0285	-0.0345	-0.0285
		5795	5795.0377	5795.0425	-0.0377	-0.0425



ANT2

Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)			Δ Frequency (MHz)		
			802.11a	802.11n HT20	802.11ac HT20	802.11a	802.11n HT20	802.11ac HT20
26.4V	-20℃	5745	5745.0365	5745.0354	5745.0381	-0.0365	-0.0354	-0.0381
		5785	5785.0353	5785.0365	5785.0354	-0.0353	-0.0365	-0.0354
		5825	5825.0334	5825.0343	5825.0370	-0.0334	-0.0343	-0.0370
21.6V		5745	5745.0304	5745.0285	5745.0262	-0.0304	-0.0285	-0.0262
		5785	5785.0355	5785.0357	5785.0357	-0.0355	-0.0357	-0.0357
		5825	5825.0484	5825.0443	5825.0500	-0.0484	-0.0443	-0.0500
24.0V	25℃	5745	5745.0343	5745.0392	5745.0394	-0.0343	-0.0392	-0.0394
		5785	5785.0470	5785.0487	5785.0515	-0.0470	-0.0487	-0.0515
		5825	5825.0265	5825.0265	5825.0247	-0.0265	-0.0265	-0.0247
26.4V	50℃	5745	5745.0653	5745.0656	5745.0691	-0.0653	-0.0656	-0.0691
		5785	5785.0487	5785.0473	5785.0483	-0.0487	-0.0473	-0.0483
		5825	5825.0684	5825.0645	5825.0687	-0.0684	-0.0645	-0.0687
21.6V	50℃	5745	5745.0443	5745.0453	5745.0514	-0.0443	-0.0453	-0.0514
		5785	5785.0291	5785.0265	5785.0291	-0.0291	-0.0265	-0.0291
		5825	5825.0743	5825.0743	5825.0742	-0.0743	-0.0743	-0.0742

Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)		Δ Frequency (MHz)	
			802.11n HT40	802.11ac HT40	802.11n HT40	802.11ac HT40
26.4V	-20℃	5755	5755.0545	5755.0543	-0.0545	-0.0543
		5795	5795.0683	5795.0685	-0.0683	-0.0685
21.6V		5755	5755.0274	5755.0651	-0.0274	-0.0651
		5795	5795.0516	5795.0492	-0.0516	-0.0492
24.0V	25℃	5755	5755.0295	5755.0253	-0.0295	-0.0253
		5795	5795.0581	5795.0556	-0.0581	-0.0556
26.4V	50℃	5755	5755.0494	5755.0474	-0.0494	-0.0474
		5795	5795.0363	5795.0363	-0.0363	-0.0363
21.6V	50℃	5755	5755.0414	5755.0354	-0.0414	-0.0354
		5795	5795.0447	5795.0495	-0.0447	-0.0495



9. TRANSMISSION IN THE ABSENCE OF DATA

9.1 STANDARD REQUIREMENT

According to §15.407(c)

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 signaling 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.

9.2 TEST RESULT

No non-compliance noted:
Refer to the theory of operation.

10. ANTENNA REQUIREMENT

10.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: 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.

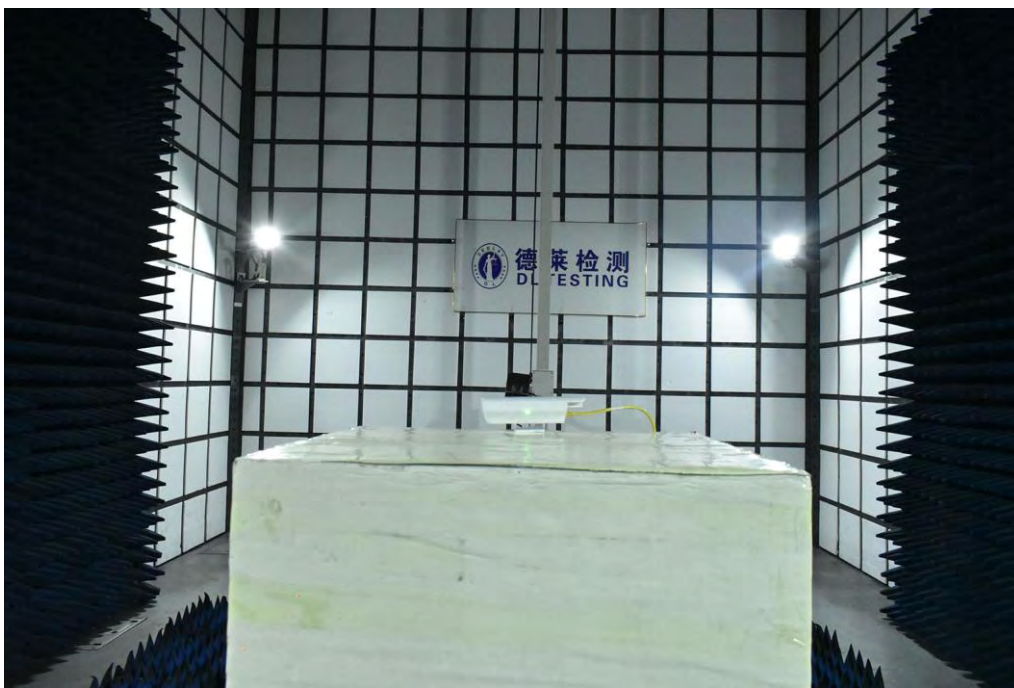
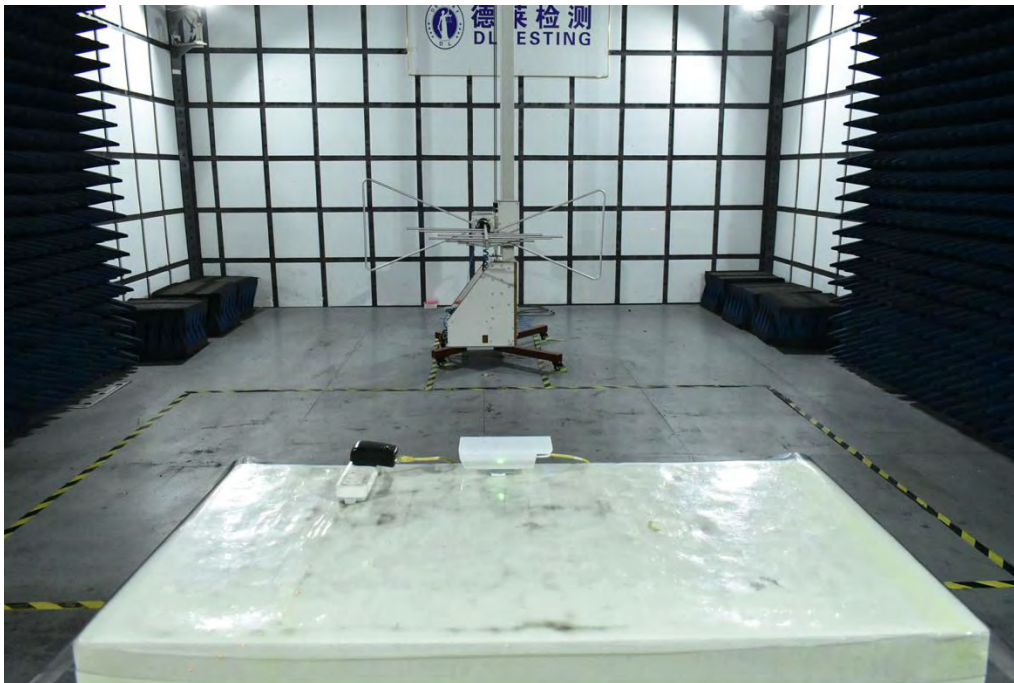
10.2 EUT ANTENNA

The EUT antenna is internal antenna, It comply with the standard requirement.



11. TEST SEUUP PHOTO

Radiated Measurement Photos



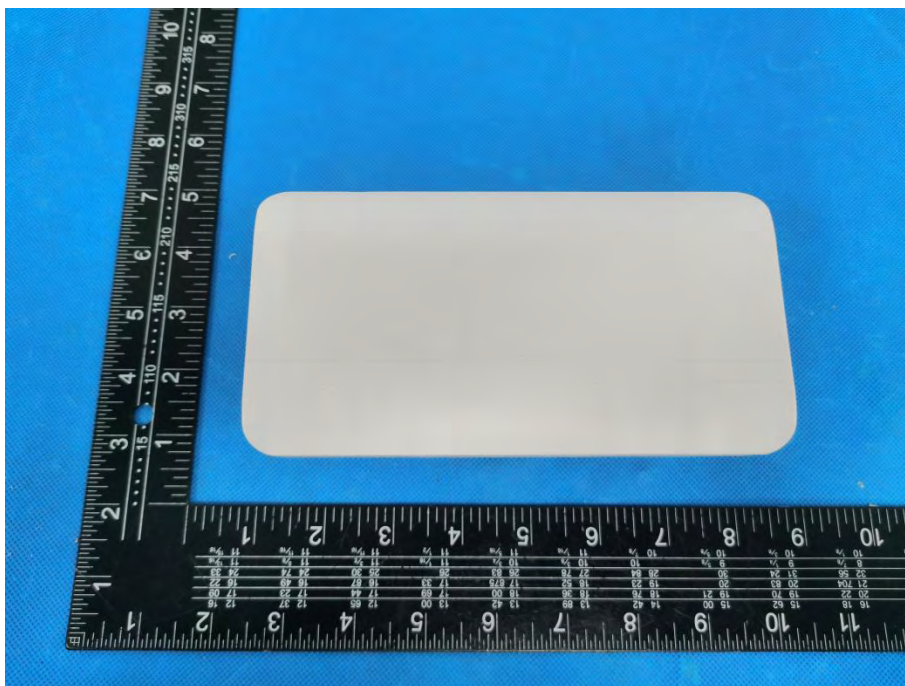
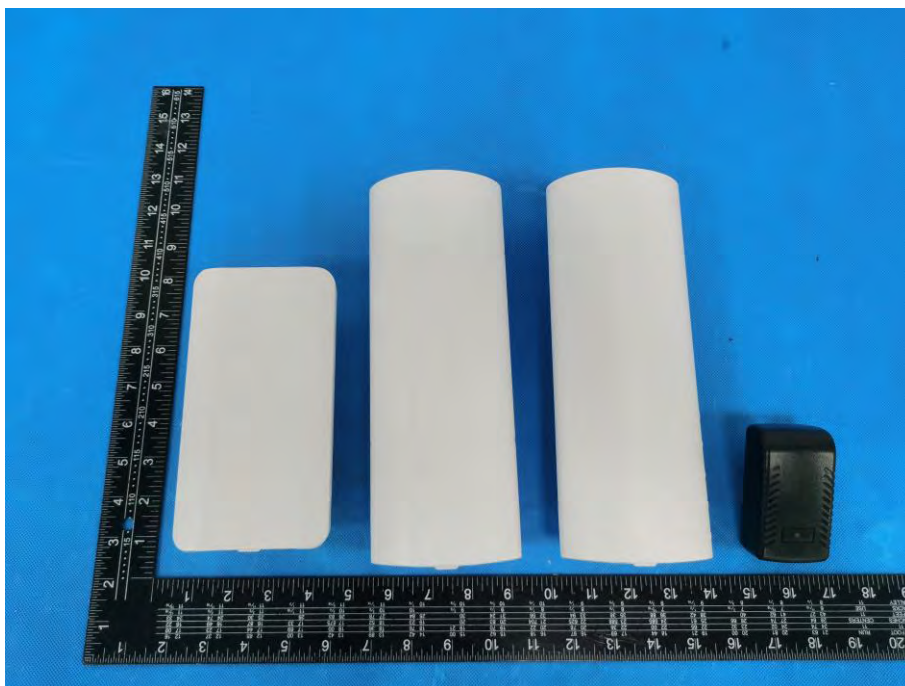


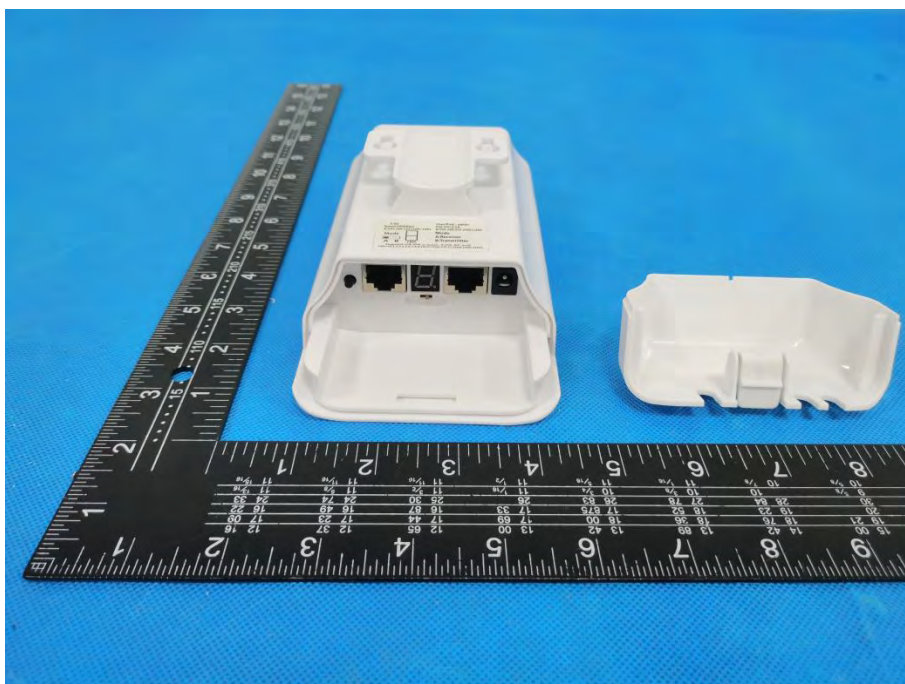
Conducted Measurement Photos





12. EUT PHOTO





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