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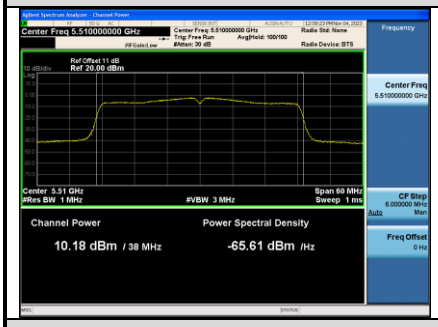	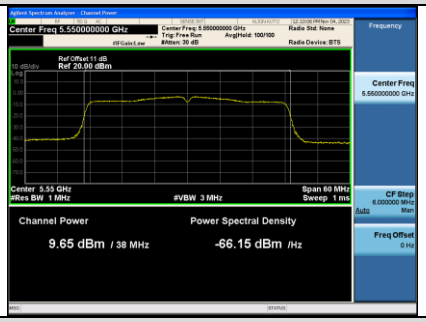	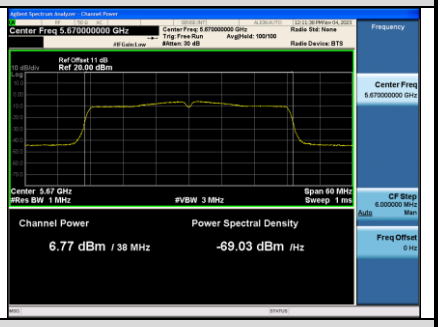
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U-NII-3 Band		
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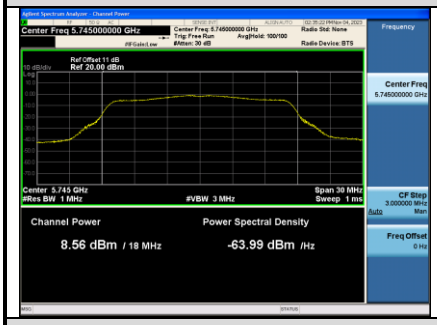	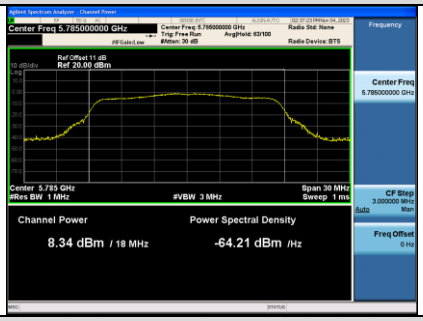	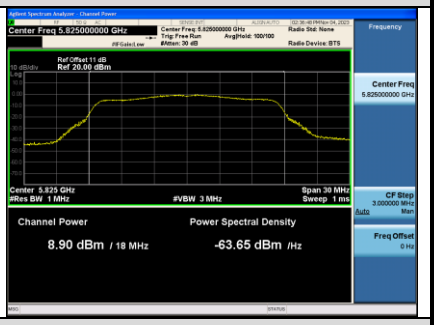
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	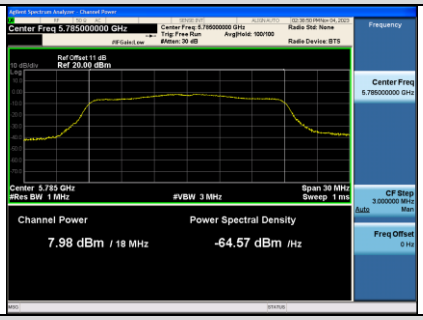	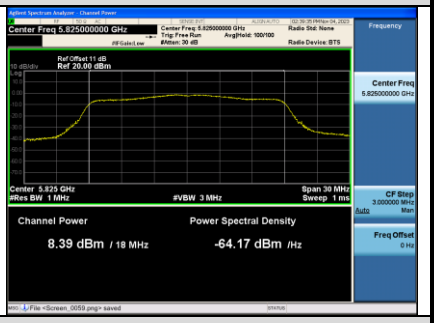
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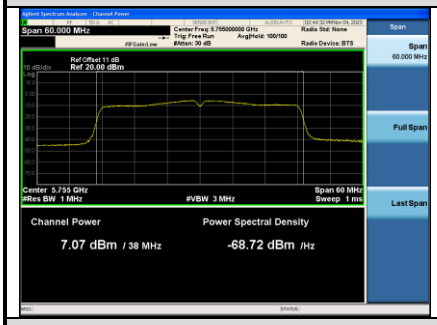		---
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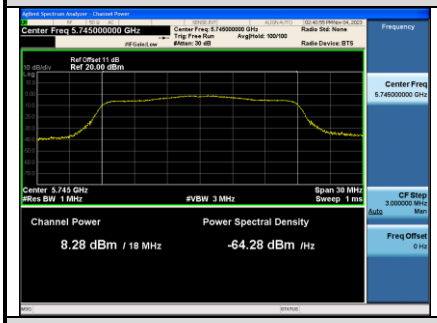	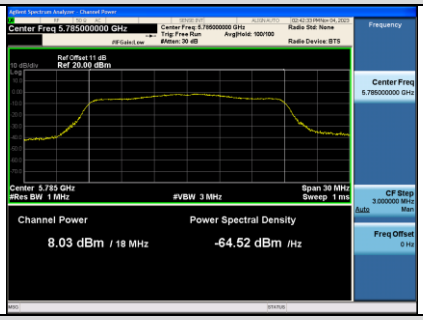	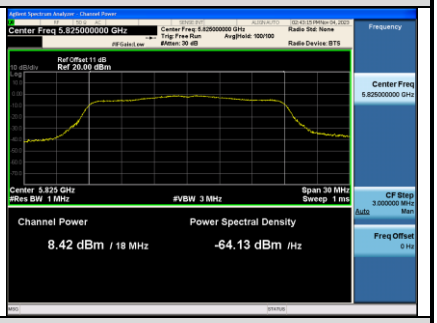
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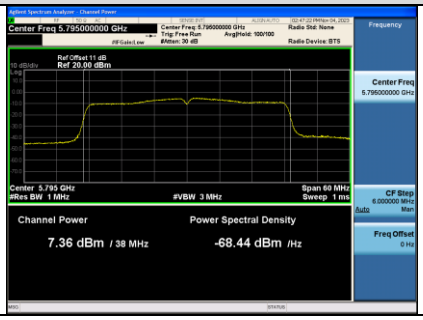
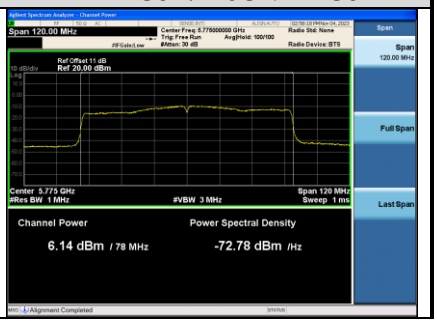
		

8. SPECTRAL DENSITY TEST

8.1.Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Apr.01,23	1 Year
2.	Attenuator(10dB)	Agilent	8491B	MY39269201	Apr.02,23	1 Year
3.	RF Cable	HUBER+SUHNER	SUCOFLEX-106	505238/6	Apr.02,23	1 Year

8.2.Limit

Band 5150-5250 MHz:
The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.
Band 5250-5350 MHz:
The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.
Band 5470-5725 MHz:
The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.
Band 5725-5850 MHz:
The power spectral density shall not exceed 30 dBm in any 500 KHz band.

8.3.Test Procedure

Use the test method described in ANSI C63.10 clause 12.5:
For the Band 5.15-5.35GHz; 5.47-5.725 GHz:
The transmitter output was connected to a spectrum analyzer. Power density was measured by spectrum analyzer with 1MHz RBW and 3MHz VBW; Detector: RMS mode.

For the band 5.725-5.85 GHz:
The transmitter output was connected to a spectrum analyzer.
So use the test method described in KDB789033 clause E

1) Set the RBW=100kHz and VBW =300kHz
2) Number of points in sweep ≥ 2 Span / RBW.(This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
3) Sweep time = auto
4) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
5) Use the “peak search” function of spectrum analyzer find the max value, then add 10log (500kHz/RBW) to the measured result.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

8.4.Test Results

U-NII-1 Band:

EUT: Electronic paper display		
M/N: EP-C251		
Test date: 2023-11-07	Pressure: 102.5±1.0 kpa	Humidity: 53.6±3.0%
Tested by: Jason	Test site: RF site	Temperature: 22.4±0.6℃

Test Mode	Frequency (MHz)	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)
11a	5180	1.924	11
	5200	3.149	
	5240	3.012	
11n HT20	5180	2.599	11
	5200	2.655	
	5240	2.431	
11n HT40	5190	-1.018	11
	5230	-1.005	
11ac VHT20	5180	2.645	11
	5200	2.645	
	5240	2.408	
11ac VHT40	5190	-1.111	11
	5230	-1.224	
11ac VHT80	5210	-5.544	11
Conclusion:Pass			

U-NII-2A Band:

EUT: Electronic paper display		
M/N: EP-C251		
Test date: 2023-11-07	Pressure: 102.5±1.0 kpa	Humidity: 53.6±3.0%
Tested by: Jason	Test site: RF site	Temperature: 22.4±0.6℃

Test Mode	Frequency (MHz)	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)
11a	5260	3.106	11
	5300	3.011	
	5320	3.223	
11n HT20	5260	2.374	11
	5300	2.323	
	5320	2.484	
11n HT40	5270	-1.829	11
	5310	-2.030	
11ac VHT20	5260	2.358	11
	5300	2.329	
	5320	2.149	
11ac VHT40	5270	-1.884	11
	5310	-1.642	
11ac VHT80	5290	-5.418	11
Conclusion:Pass			

U-NII-2C Band:

EUT: Electronic paper display		
M/N: EP-C251		
Test date: 2023-11-07~13	Pressure: 103.1±1.0 kpa	Humidity: 51.5±3.0%
Tested by: Jason	Test site: RF site	Temperature: 22.5±0.6 ℃

Test Mode	Frequency (MHz)	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)
11a	5500	2.094	11
	5580	-0.298	
	5700	0.126	
11n HT20	5500	1.295	11
	5580	-1.049	
	5700	-0.534	
11n HT40	5510	-2.886	11
	5550	-4.585	
	5670	-4.153	
11ac VHT20	5500	1.333	11
	5580	-1.268	
	5700	-0.077	
11ac VHT40	5510	-2.582	11
	5550	-4.677	
	5670	-4.227	
11ac VHT80	5530	-6.795	11
Conclusion: Pass			

U-NII-3 Band:

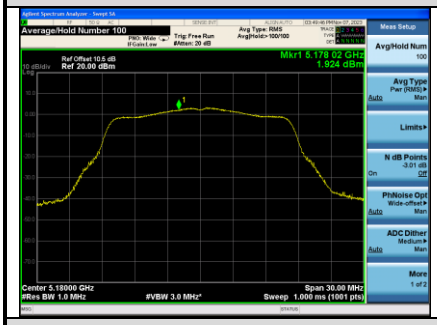
EUT: Electronic paper display		
M/N: EP-C251		
Test date: 2023-11-13	Pressure: 103.1±1.0 kpa	Humidity: 51.5±3.0%
Tested by: Jason	Test site: RF site	Temperature: 22.5±0.6 ℃

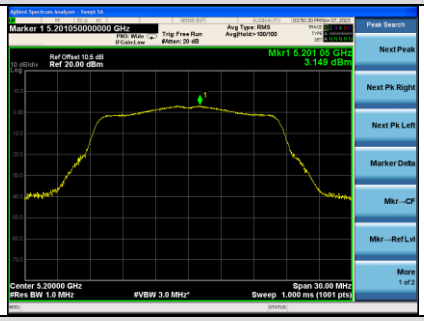
Test Mode	Frequency (MHz)	Power Spectral Density (dBm/500KHz)	Limit (dBm/500KHz)
11a	5745	-2.54	30
	5785	-2.80	
	5825	-2.54	
11n HT20	5745	-2.91	30
	5785	-3.78	
	5825	-3.30	
11n HT40	5755	-7.54	30
	5795	-7.53	
11ac VHT20	5745	-2.97	30
	5785	-3.02	
	5825	-3.39	
11ac VHT40	5755	-7.70	30
	5795	-7.70	
11ac VHT80	5775	-11.36	30
Conclusion: Pass			

Note: The result = Beading + 10log(500kHz/100kHz)

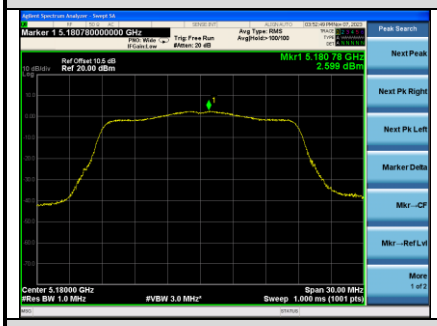
U-NII-1 Band

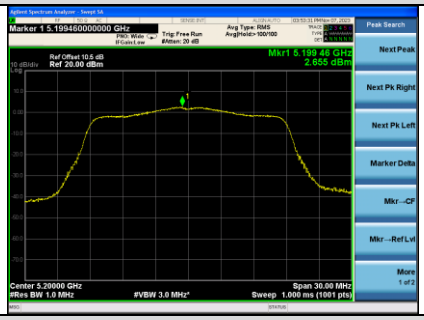
IEEE 802.11a





IEEE 802.11n HT20





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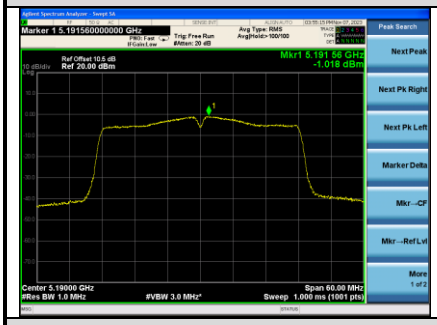
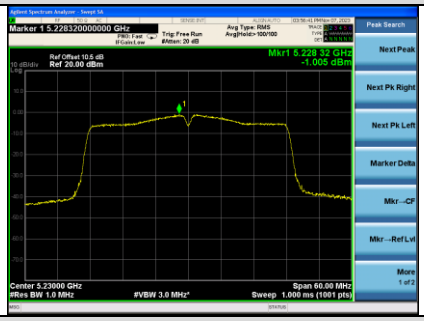
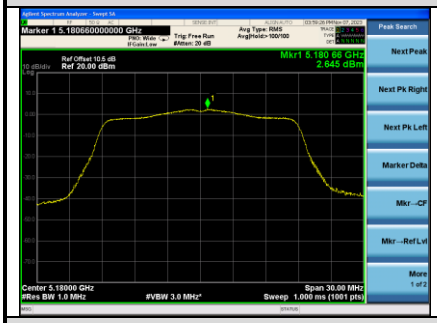
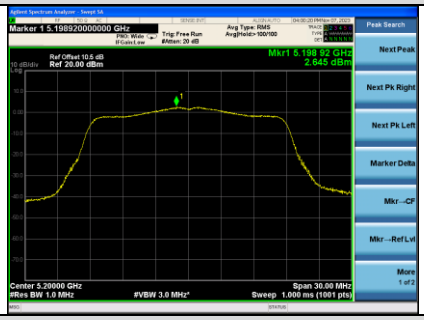
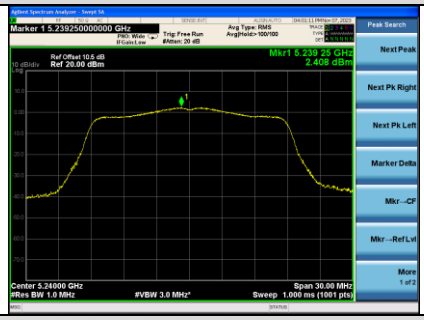




IEEE 802.11ac VHT20







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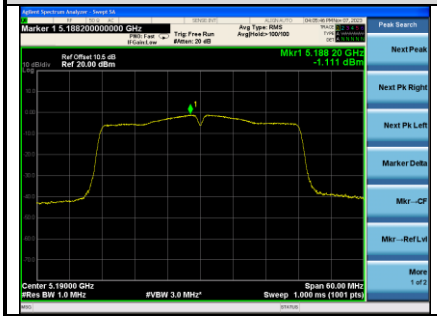

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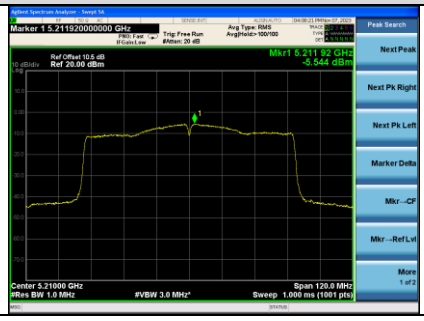
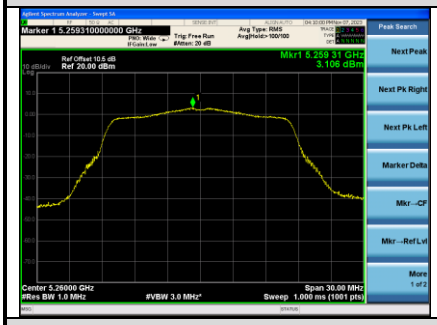
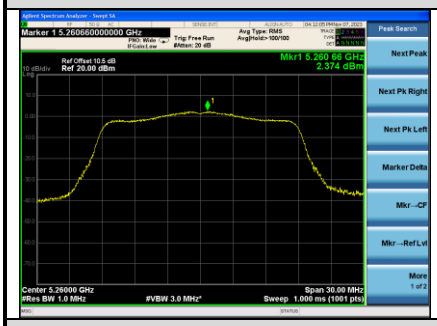


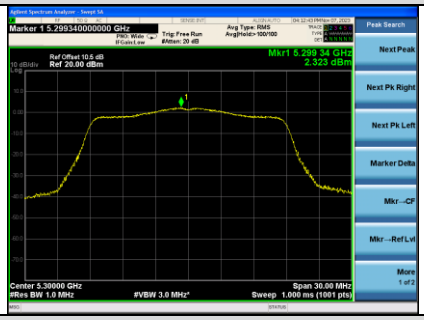
U-NII-2A Band

IEEE 802.11a



IEEE 802.11n HT20





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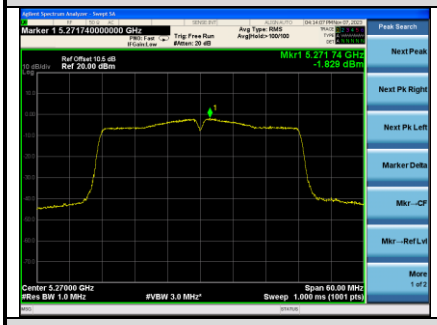

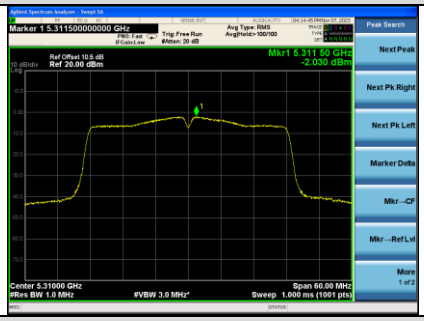

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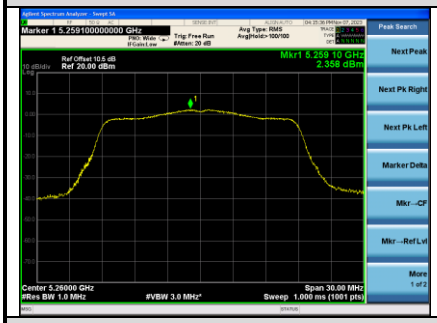

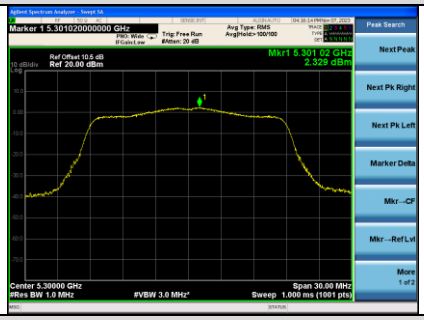

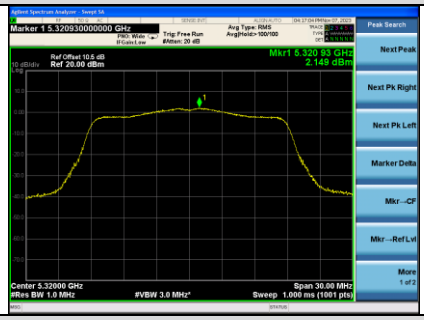

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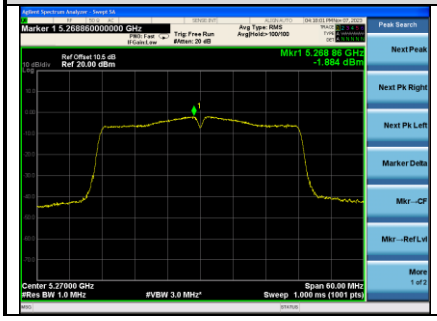

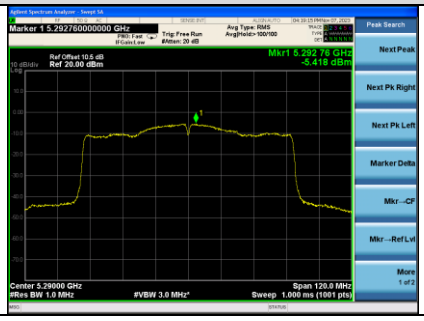

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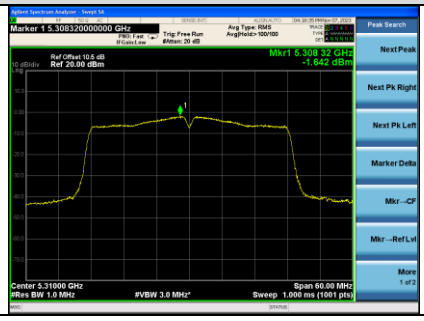
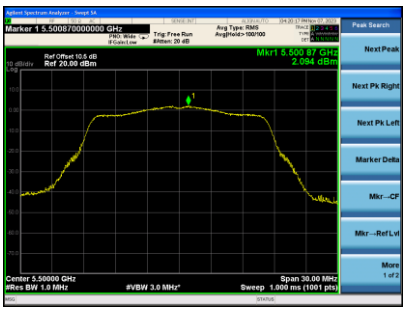


U-NII-2C Band

IEEE 802.11a



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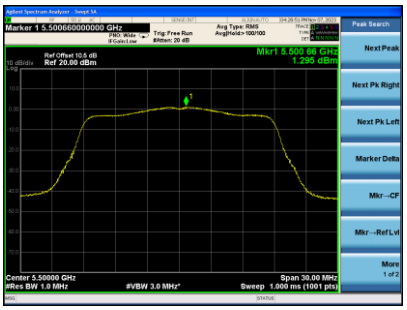
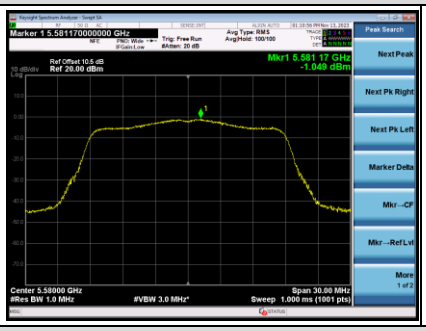


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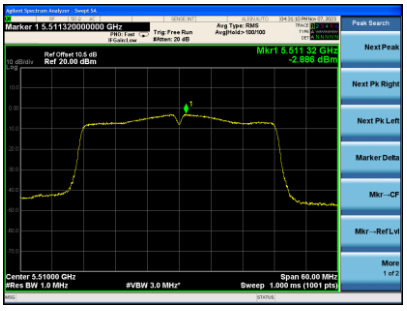
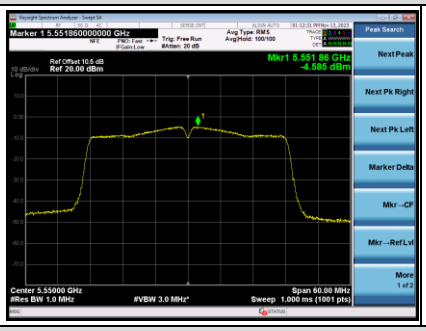
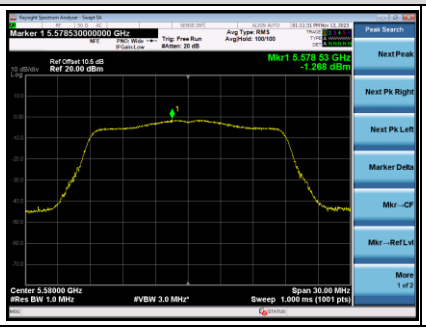




IEEE 802.11ac VHT20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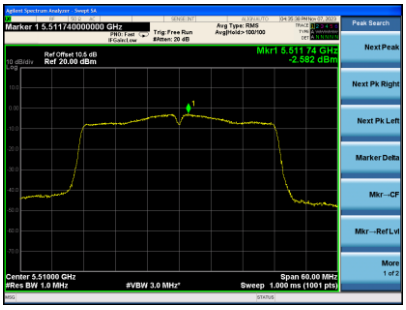	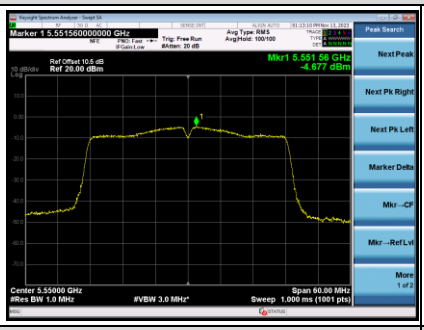	
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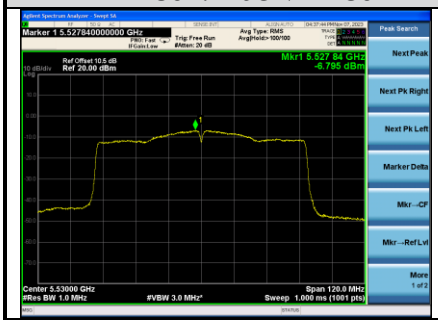	---	---

U-NII-3 Band		
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	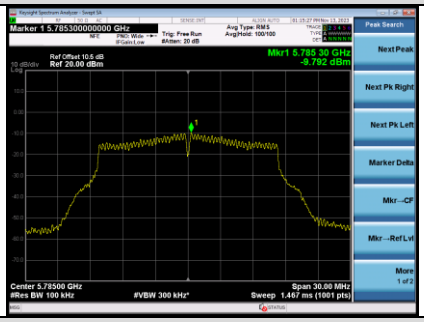	
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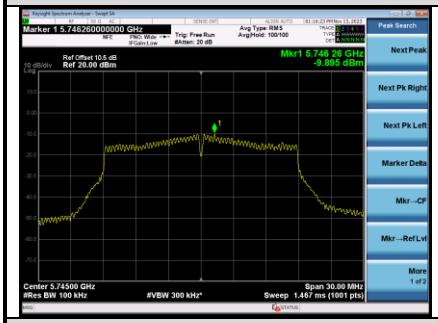	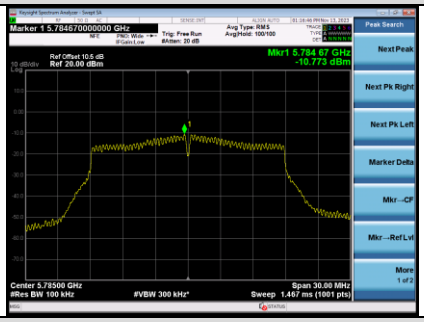	
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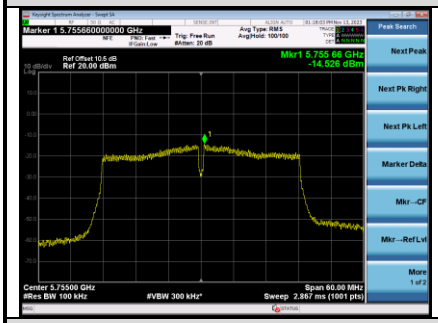	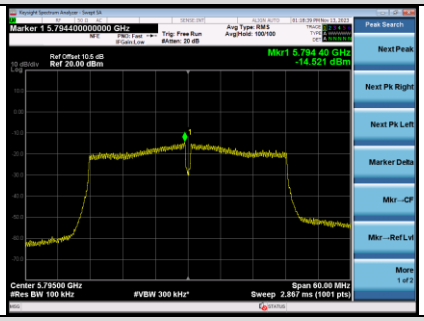	---
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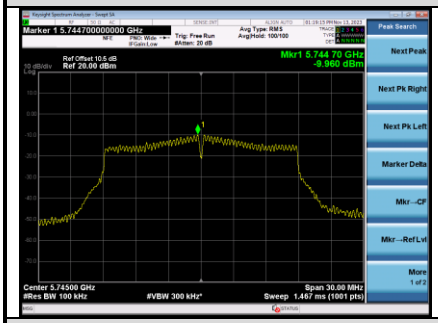	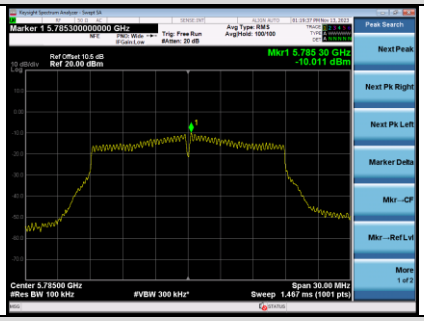	
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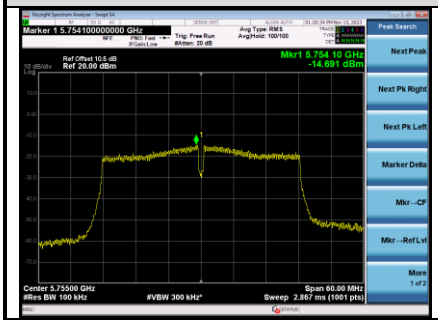	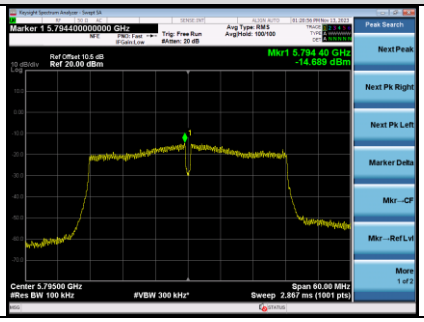	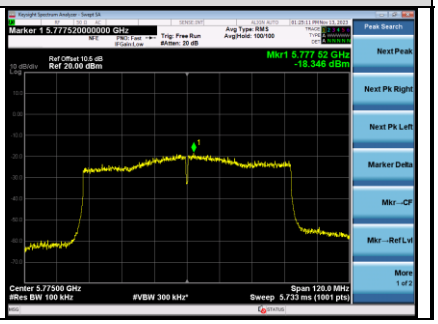

9. FREQUENCY STABILITY MEASUREMENT

9.1.Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Apr.01,23	1 Year
2.	Attenuator(10dB)	Agilent	8491B	MY39269201	Apr.02,23	1 Year
3.	RF Cable	HUBER+SUHNER	SUCOFLEX-106	505238/6	Apr.02,23	1 Year

9.2.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.

9.3.Test Procedure

Use the test method described in ANSI C63.10 clause 6.8:

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
   EUT have transmitted absence of modulation signal and fixed channelise. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings. fc is declaring of channel frequency. Then the frequency error formula is $(fc-f)/f \times 10^{-6}$ppm. The test extreme voltage is to change the primary supply voltage from 108V to 132V.
2. Extreme temperature is 0℃~35℃.

9.4.Test Result

EUT: Electronic paper display		
M/N: EP-C251		
Test date: 2023-11-07	Pressure: 103.1±1.0 kpa	Humidity: 51.5±3.0%
Tested by: Jason	Test site: RF site	Temperature:22.5±0.6 ℃

Frequency Stability vs.Voltage:

Test Voltage	Temperature	CH	Reading (MHz)	Target Frequency (MHz)	Result (ppm)
AC 120V	25℃	CH36	5180.0115	5180	2.2201
		CH38	5190.0135	5190	2.6012
		CH40	5200.0120	5200	2.3077
		CH42	5210.0125	5210	2.3992
		CH46	5230.0130	5230	2.4857
		CH48	5240.0120	5240	2.2901
		CH52	5260.0130	5260	2.4715
		CH54	5270.0125	5270	2.3719
		CH58	5290.0125	5290	2.3629
		CH60	5300.0125	5300	2.3585
		CH62	5310.0125	5310	2.3540
		CH64	5320.0125	5320	2.3496
		CH100	5500.0140	5500	2.5455
		CH102	5510.0130	5510	2.3593
		CH106	5530.0130	5530	2.3508
		CH110	5550.0170	5550	3.0631
		CH116	5580.0220	5580	3.9427
		CH134	5670.0130	5670	2.2928
		CH140	5700.0135	5700	2.3684
		CH149	5745.0140	5745	2.4369
		CH151	5755.0135	5755	2.3458
		CH155	5775.0130	5775	2.2511
		CH157	5785.0135	5785	2.3336
		CH159	5795.0135	5795	2.3296
		CH165	5825.0135	5825	2.3176

Test Voltage	Temperature	CH	Reading (MHz)	Target Frequency (MHz)	Result (ppm)
AC 108V	25℃	CH36	5180.0110	5180	2.1236
		CH38	5190.0130	5190	2.5048
		CH40	5200.0115	5200	2.2115
		CH42	5210.0120	5210	2.3033
		CH46	5230.0125	5230	2.3901
		CH48	5240.0115	5240	2.1947
		CH52	5260.0125	5260	2.3764
		CH54	5270.0120	5270	2.2770
		CH58	5290.0120	5290	2.2684
		CH60	5300.0120	5300	2.2642
		CH62	5310.0120	5310	2.2599
		CH64	5320.0120	5320	2.2556
		CH100	5500.0135	5500	2.4545
		CH102	5510.0125	5510	2.2686
		CH106	5530.0125	5530	2.2604
		CH110	5550.0165	5550	2.9730
		CH116	5580.0215	5580	3.8530
		CH134	5670.0125	5670	2.2046
		CH140	5700.0130	5700	2.2807
		CH149	5745.0135	5745	2.3499
		CH151	5755.0130	5755	2.2589
		CH155	5775.0125	5775	2.1645
		CH157	5785.0130	5785	2.2472
		CH159	5795.0130	5795	2.2433
		CH165	5825.0130	5825	2.2318

Test Voltage	Temperature	CH	Reading (MHz)	Target Frequency (MHz)	Result (ppm)
AC 132V	25℃	CH36	5180.0105	5180	2.0270
		CH38	5190.0125	5190	2.4085
		CH40	5200.0110	5200	2.1154
		CH42	5210.0115	5210	2.2073
		CH46	5230.0120	5230	2.2945
		CH48	5240.0110	5240	2.0992
		CH52	5260.0120	5260	2.2814
		CH54	5270.0115	5270	2.1822
		CH58	5290.0115	5290	2.1739
		CH60	5300.0115	5300	2.1698
		CH62	5310.0115	5310	2.1657
		CH64	5320.0115	5320	2.1617
		CH100	5500.0130	5500	2.3636
		CH102	5510.0120	5510	2.1779
		CH106	5530.0120	5530	2.1700
		CH110	5550.0175	5550	3.1532
		CH116	5580.0225	5580	4.0323
		CH134	5670.0120	5670	2.1164
		CH140	5700.0125	5700	2.1930
		CH149	5745.0130	5745	2.2628
		CH151	5755.0125	5755	2.1720
		CH155	5775.0120	5775	2.0779
		CH157	5785.0125	5785	2.1608
		CH159	5795.0125	5795	2.1570
		CH165	5825.0125	5825	2.1459

Frequency Stability vs.Temperature:

Test Voltage	Temperature	CH	Reading (MHz)	Target Frequency (MHz)	Result (ppm)
AC 120V	0℃	CH36	5180.0115	5180	2.2201
		CH38	5190.0145	5190	2.7938
		CH40	5200.0135	5200	2.5962
		CH42	5210.0135	5210	2.5912
		CH46	5230.0145	5230	2.7725
		CH48	5240.0135	5240	2.5763
		CH52	5260.0125	5260	2.3764
		CH54	5270.0125	5270	2.3719
		CH58	5290.0115	5290	2.1739
		CH60	5300.0125	5300	2.3585
		CH62	5310.0130	5310	2.4482
		CH64	5320.0120	5320	2.2556
		CH100	5500.0120	5500	2.1818
		CH102	5510.0110	5510	1.9964
		CH106	5530.0175	5530	3.1646
		CH110	5550.0110	5550	1.9820
		CH116	5580.0230	5580	4.1219
		CH134	5670.0120	5670	2.1164
		CH140	5700.0165	5700	2.8947
		CH149	5745.0145	5745	2.5239
		CH151	5755.0135	5755	2.3458
		CH155	5775.0110	5775	1.9048
		CH157	5785.0130	5785	2.2472
		CH159	5795.0160	5795	2.7610
		CH165	5825.0140	5825	2.4034

Test Voltage	Temperature	CH	Reading (MHz)	Target Frequency (MHz)	Result (ppm)
AC 120V	5℃	CH36	5180.0125	5180	2.4131
		CH38	5190.0145	5190	2.7938
		CH40	5200.0130	5200	2.5000
		CH42	5210.0135	5210	2.5912
		CH46	5230.0140	5230	2.6769
		CH48	5240.0130	5240	2.4809
		CH52	5260.0140	5260	2.6616
		CH54	5270.0135	5270	2.5617
		CH58	5290.0135	5290	2.5520
		CH60	5300.0135	5300	2.5472
		CH62	5310.0135	5310	2.5424
		CH64	5320.0135	5320	2.5376
		CH100	5500.0150	5500	2.7273
		CH102	5510.0140	5510	2.5408
		CH106	5530.0140	5530	2.5316
		CH110	5550.0185	5550	3.3333
		CH116	5580.0235	5580	4.2115
		CH134	5670.0140	5670	2.4691
		CH140	5700.0145	5700	2.5439
		CH149	5745.0150	5745	2.6110
		CH151	5755.0145	5755	2.5195
		CH155	5775.0140	5775	2.4242
		CH157	5785.0145	5785	2.5065
		CH159	5795.0145	5795	2.5022
		CH165	5825.0145	5825	2.4893

Test Voltage	Temperature	CH	Reading (MHz)	Target Frequency (MHz)	Result (ppm)
AC 120V	10℃	CH36	5180.0100	5180	1.9305
		CH38	5190.0120	5190	2.3121
		CH40	5200.0105	5200	2.0192
		CH42	5210.0110	5210	2.1113
		CH46	5230.0115	5230	2.1989
		CH48	5240.0105	5240	2.0038
		CH52	5260.0115	5260	2.1863
		CH54	5270.0110	5270	2.0873
		CH58	5290.0110	5290	2.0794
		CH60	5300.0110	5300	2.0755
		CH62	5310.0110	5310	2.0716
		CH64	5320.0110	5320	2.0677
		CH100	5500.0125	5500	2.2727
		CH102	5510.0115	5510	2.0871
		CH106	5530.0115	5530	2.0796
		CH110	5550.0155	5550	2.7928
		CH116	5580.0205	5580	3.6738
		CH134	5670.0115	5670	2.0282
		CH140	5700.0120	5700	2.1053
		CH149	5745.0125	5745	2.1758
		CH151	5755.0120	5755	2.0851
		CH155	5775.0115	5775	1.9913
		CH157	5785.0120	5785	2.0743
		CH159	5795.0120	5795	2.0708
		CH165	5825.0120	5825	2.0601

Test Voltage	Temperature	CH	Reading (MHz)	Target Frequency (MHz)	Result (ppm)
AC 120V	15℃	CH36	5180.0130	5180	2.5097
		CH38	5190.0150	5190	2.8902
		CH40	5200.0135	5200	2.5962
		CH42	5210.0140	5210	2.6871
		CH46	5230.0145	5230	2.7725
		CH48	5240.0135	5240	2.5763
		CH52	5260.0145	5260	2.7567
		CH54	5270.0140	5270	2.6565
		CH58	5290.0140	5290	2.6465
		CH60	5300.0140	5300	2.6415
		CH62	5310.0140	5310	2.6365
		CH64	5320.0140	5320	2.6316
		CH100	5500.0155	5500	2.8182
		CH102	5510.0145	5510	2.6316
		CH106	5530.0145	5530	2.6221
		CH110	5550.0150	5550	2.7027
		CH116	5580.0200	5580	3.5842
		CH134	5670.0145	5670	2.5573
		CH140	5700.0150	5700	2.6316
		CH149	5745.0155	5745	2.6980
		CH151	5755.0150	5755	2.6064
		CH155	5775.0145	5775	2.5108
		CH157	5785.0150	5785	2.5929
		CH159	5795.0150	5795	2.5884
		CH165	5825.0150	5825	2.5751

Test Voltage	Temperature	CH	Reading (MHz)	Target Frequency (MHz)	Result (ppm)
AC 120V	25℃	CH36	5180.0140	5180	2.7027
		CH38	5190.0160	5190	3.0829
		CH40	5200.0145	5200	2.7885
		CH42	5210.0150	5210	2.8791
		CH46	5230.0155	5230	2.9637
		CH48	5240.0145	5240	2.7672
		CH52	5260.0155	5260	2.9468
		CH54	5270.0150	5270	2.8463
		CH58	5290.0150	5290	2.8355
		CH60	5300.0150	5300	2.8302
		CH62	5310.0150	5310	2.8249
		CH64	5320.0150	5320	2.8195
		CH100	5500.0165	5500	3.0000
		CH102	5510.0155	5510	2.8131
		CH106	5530.0155	5530	2.8029
		CH110	5550.0190	5550	3.4234
		CH116	5580.0240	5580	4.3011
		CH134	5670.0155	5670	2.7337
		CH140	5700.0160	5700	2.8070
		CH149	5745.0165	5745	2.8721
		CH151	5755.0160	5755	2.7802
		CH155	5775.0155	5775	2.6840
		CH157	5785.0160	5785	2.7658
		CH159	5795.0160	5795	2.7610
		CH165	5825.0160	5825	2.7468

Test Voltage	Temperature	CH	Reading (MHz)	Target Frequency (MHz)	Result (ppm)
AC 120V	30℃	CH36	5180.0095	5180	1.8340
		CH38	5190.0115	5190	2.2158
		CH40	5200.0100	5200	1.9231
		CH42	5210.0105	5210	2.0154
		CH46	5230.0110	5230	2.1033
		CH48	5240.0100	5240	1.9084
		CH52	5260.0110	5260	2.0913
		CH54	5270.0105	5270	1.9924
		CH58	5290.0105	5290	1.9849
		CH60	5300.0105	5300	1.9811
		CH62	5310.0105	5310	1.9774
		CH64	5320.0105	5320	1.9737
		CH100	5500.0120	5500	2.1818
		CH102	5510.0110	5510	1.9964
		CH106	5530.0110	5530	1.9892
		CH110	5550.0190	5550	3.4234
		CH116	5580.0240	5580	4.3011
		CH134	5670.0110	5670	1.9400
		CH140	5700.0115	5700	2.0175
		CH149	5745.0120	5745	2.0888
		CH151	5755.0115	5755	1.9983
		CH155	5775.0110	5775	1.9048
		CH157	5785.0115	5785	1.9879
		CH159	5795.0115	5795	1.9845
		CH165	5825.0115	5825	1.9742

Test Voltage	Temperature	CH	Reading (MHz)	Target Frequency (MHz)	Result (ppm)
AC 120V	35℃	CH36	5180.0135	5180	2.6062
		CH38	5190.0155	5190	2.9865
		CH40	5200.0140	5200	2.6923
		CH42	5210.0145	5210	2.7831
		CH46	5230.0150	5230	2.8681
		CH48	5240.0140	5240	2.6718
		CH52	5260.0150	5260	2.8517
		CH54	5270.0145	5270	2.7514
		CH58	5290.0145	5290	2.7410
		CH60	5300.0145	5300	2.7358
		CH62	5310.0145	5310	2.7307
		CH64	5320.0145	5320	2.7256
		CH100	5500.0160	5500	2.9091
		CH102	5510.0150	5510	2.7223
		CH106	5530.0150	5530	2.7125
		CH110	5550.0140	5550	2.5225
		CH116	5580.0190	5580	3.4050
		CH134	5670.0150	5670	2.6455
		CH140	5700.0155	5700	2.7193
		CH149	5745.0160	5745	2.7850
		CH151	5755.0155	5755	2.6933
		CH155	5775.0150	5775	2.5974
		CH157	5785.0155	5785	2.6793
		CH159	5795.0155	5795	2.6747
		CH165	5825.0155	5825	2.6609

10. ANTENNA REQUIREMENT

10.1. Standard Applicable

For intentional device, according to FCC 47 CFR Section 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. And according to FCC 47 CFR Section 15.407 (a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

10.2. Antenna Connected Construction

The antennas used for this product is shrapnel Antenna that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is Bluetooth Peak Gain: 2.69dBi , 2.4GHz Peak Gain: 2.69dBi , U-NII-1 Band Peak Gain: 2.28dBi, U-NII-2A Band Peak Gain: 2.28dBi, U-NII-2C Band Peak Gain: 2.28dBi, U-NII-3 Band Peak Gain: 2.22dBi.

11. DEVIATION TO TEST SPECIFICATIONS

[NONE]

THE END