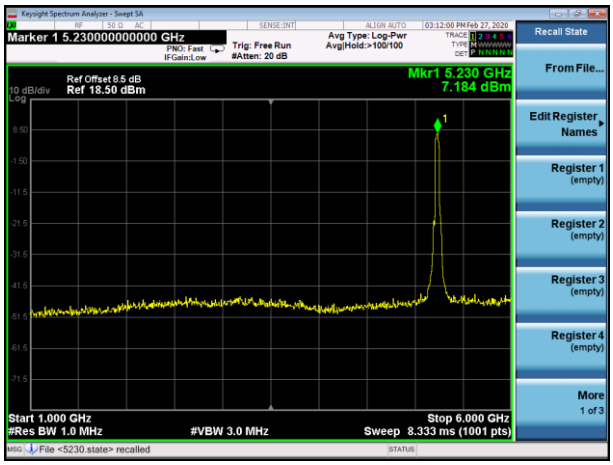
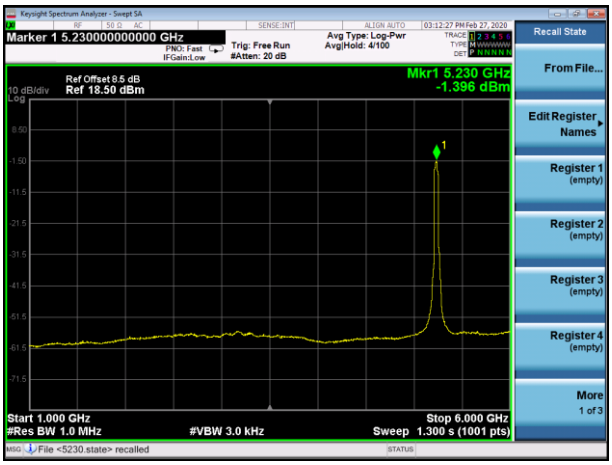
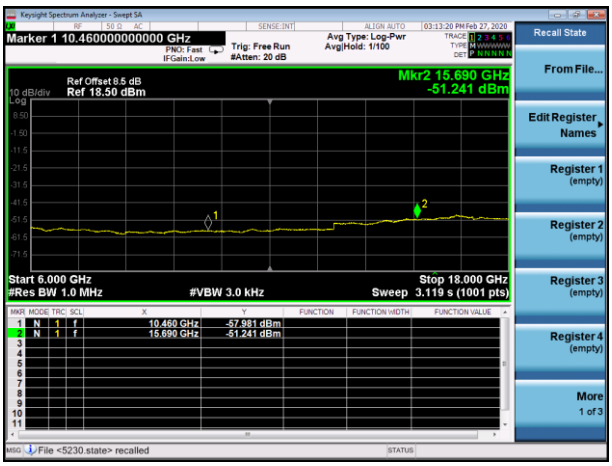
Test Mode:		802.11n HT40		Test channel:		5230MHz	
Frequency (MHz)	Read Level (dBm)	Antenna Gain (dBi)	EIRP (dBm)	E (dBμV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
10460	-47.40	2.00	-45.40	49.86	68.20	-18.34	Peak
15690	-40.79	2.00	-38.79	56.47	68.20	-11.73	Peak
10460	-57.98	2.00	-55.98	39.28	54.00	-14.72	Average
15690	-51.24	2.00	-49.24	46.02	54.00	-7.98	Average



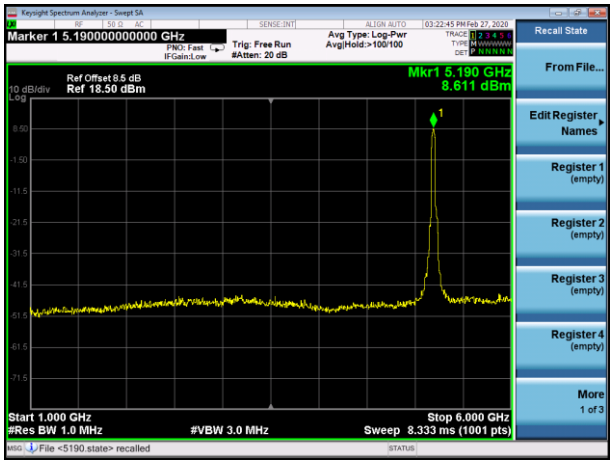


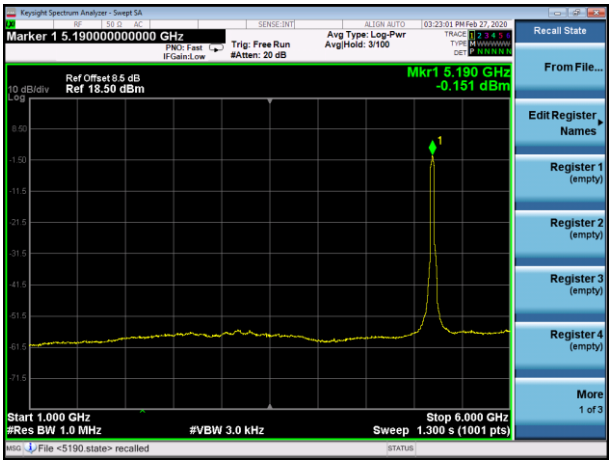
Peak

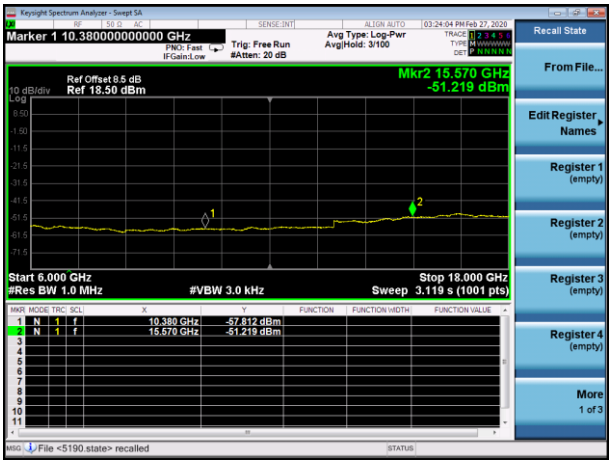


Average

Test Mode:		802.11ac HT40		Test channel:		5190MHz	
Frequency (MHz)	Read Level (dBm)	Antenna Gain (dBi)	EIRP (dBm)	E (dBμV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
10380	-46.96	2.00	-44.96	50.30	68.20	-17.90	Peak
15570	-40.74	2.00	-38.74	56.51	68.20	-11.69	Peak
10380	-57.81	2.00	-55.81	39.45	54.00	-14.55	Average
15570	-51.22	2.00	-49.22	46.04	54.00	-7.96	Average



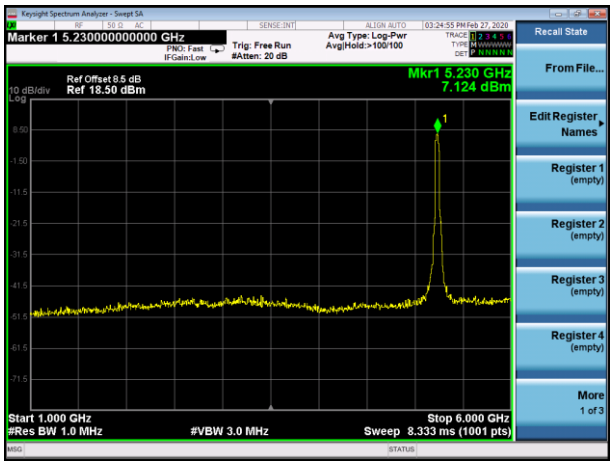


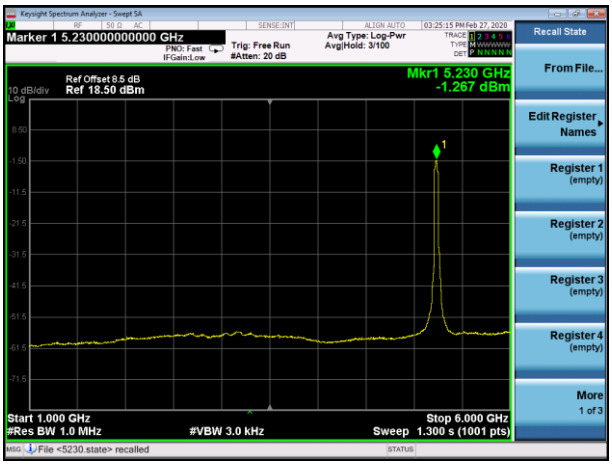


Peak

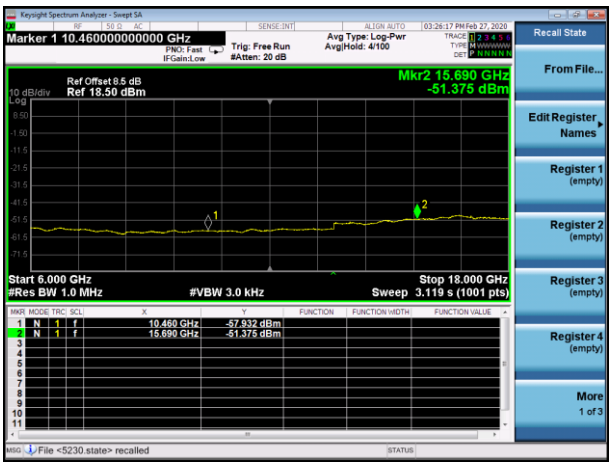
Average

Test Mode:		802.11ac HT40		Test channel:		5230MHz	
Frequency (MHz)	Read Level (dBm)	Antenna Gain (dBi)	EIRP (dBm)	E (dBμV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
10460	-47.25	2.00	-45.25	50.01	68.20	-18.19	Peak
15690	-40.60	2.00	-38.60	56.66	68.20	-11.54	Peak
10460	-57.93	2.00	-55.93	39.33	54.00	-14.67	Average
15690	-51.38	2.00	-49.38	45.88	54.00	-8.12	Average



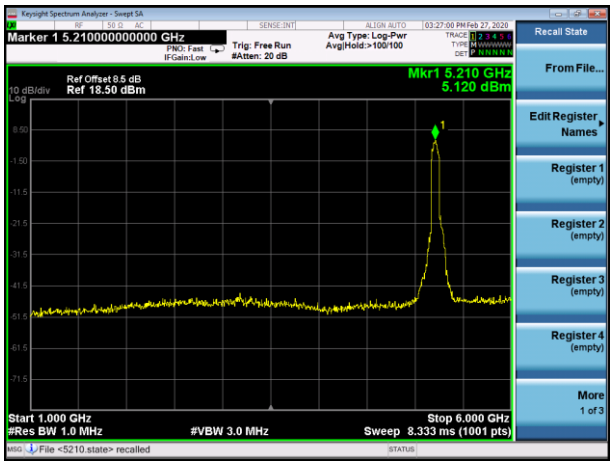


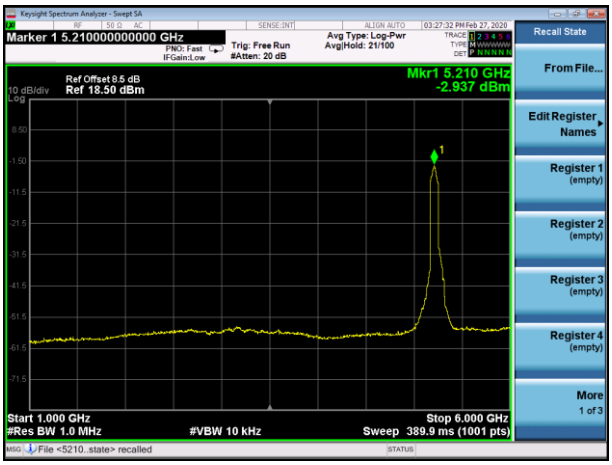
Peak



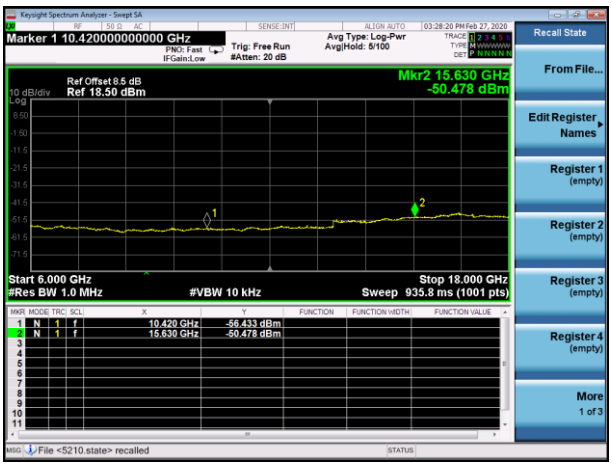
Average

Test Mode:		802.11ac HT80		Test channel:		5210MHz	
Frequency (MHz)	Read Level (dBm)	Antenna Gain (dBi)	EIRP (dBm)	E (dBμV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
10420	-46.89	2.00	-44.89	50.37	68.20	-17.83	Peak
15630	-40.17	2.00	-38.17	57.09	68.20	-11.11	Peak
10420	-56.43	2.00	-54.43	40.82	54.00	-13.18	Average
15630	-50.48	2.00	-48.48	46.78	54.00	-7.22	Average





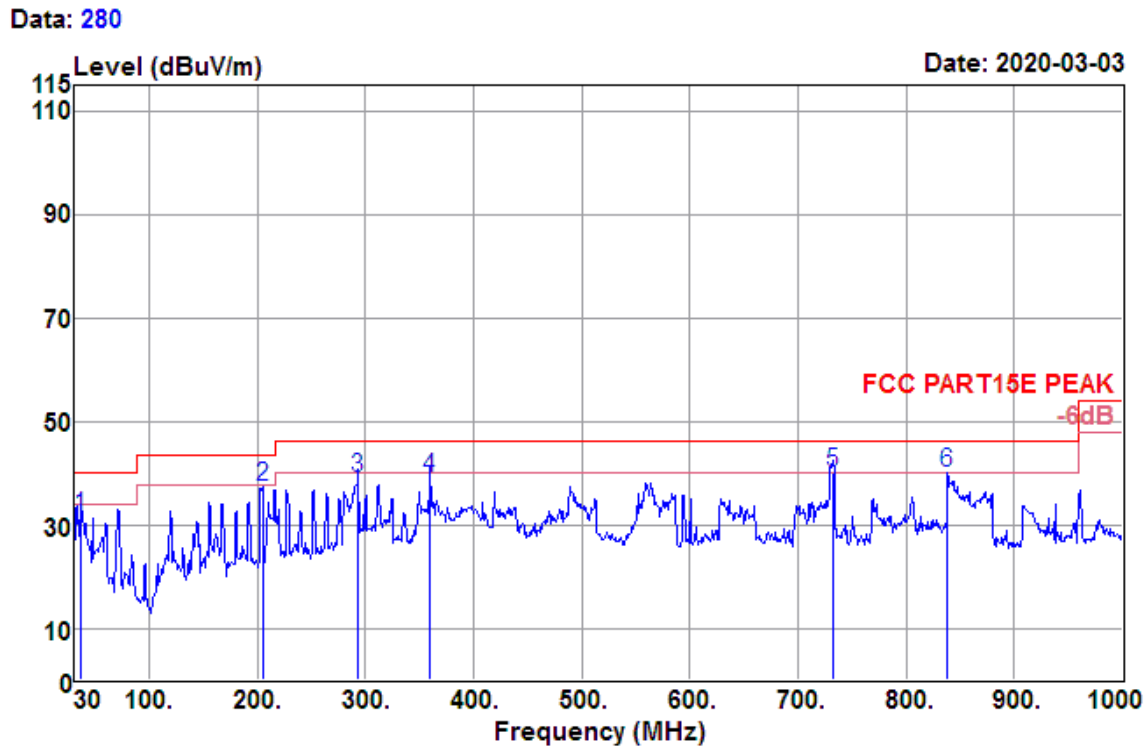
Peak



Average

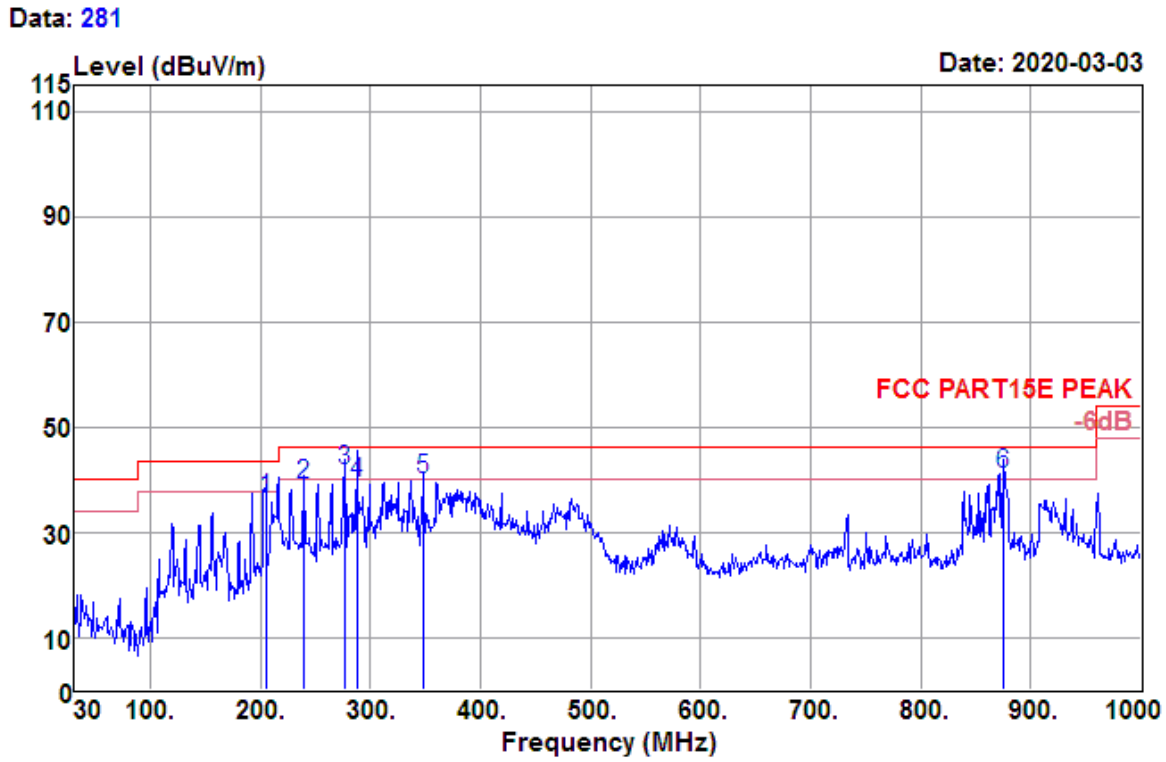
4.4.6 Test Result of Radiated Spurious Emission (30MHz ~ 1GHz)

Test Mode :	802.11 ac VHT80 CH42 5210MHz	**Temperature :**	21~23℃
Test Engineer :	Jack Liu	**Relative Humidity :**	63~65%
Frequencey Range	30MHz~1GHz	**Polarization :**	Horizontal



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
35.820	50.84	12.16	1.16	32.46	31.70	40.00	-8.30	QP
204.600	56.25	10.83	2.76	32.47	37.37	43.50	-6.13	Peak
292.870	54.26	14.04	3.35	32.49	39.16	46.00	-6.84	QP
359.800	52.82	15.00	3.74	32.53	39.03	46.00	-6.97	QP
732.280	45.13	21.85	5.45	32.53	39.90	46.00	-6.10	QP
838.010	43.71	22.70	5.85	32.26	40.00	46.00	-6.00	Peak

Test Mode :	802.11 ac VHT80 CH42 5210MHz	**Temperature :**	21~23℃
Test Engineer :	Jack Liu	**Relative Humidity :**	63~65%
Frequencey Range	30MHz~1GHz	**Polarization :**	Vertical



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
204.600	55.13	10.83	2.76	32.47	36.25	43.50	-7.25	QP
238.550	55.86	12.53	3.01	32.48	38.92	46.00	-7.08	QP
276.380	57.25	13.68	3.25	32.49	41.69	46.00	-4.31	QP
287.050	54.59	13.92	3.32	32.49	39.34	46.00	-6.66	QP
347.190	54.28	14.77	3.67	32.52	40.20	46.00	-5.80	QP
875.840	44.26	23.16	6.01	32.22	41.21	46.00	-4.79	QP

4.5 AC Conducted Emission Measurement

4.5.1 Limit of AC Conducted Emission

FCC §15.207

IC RSS-GEN 8.8

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

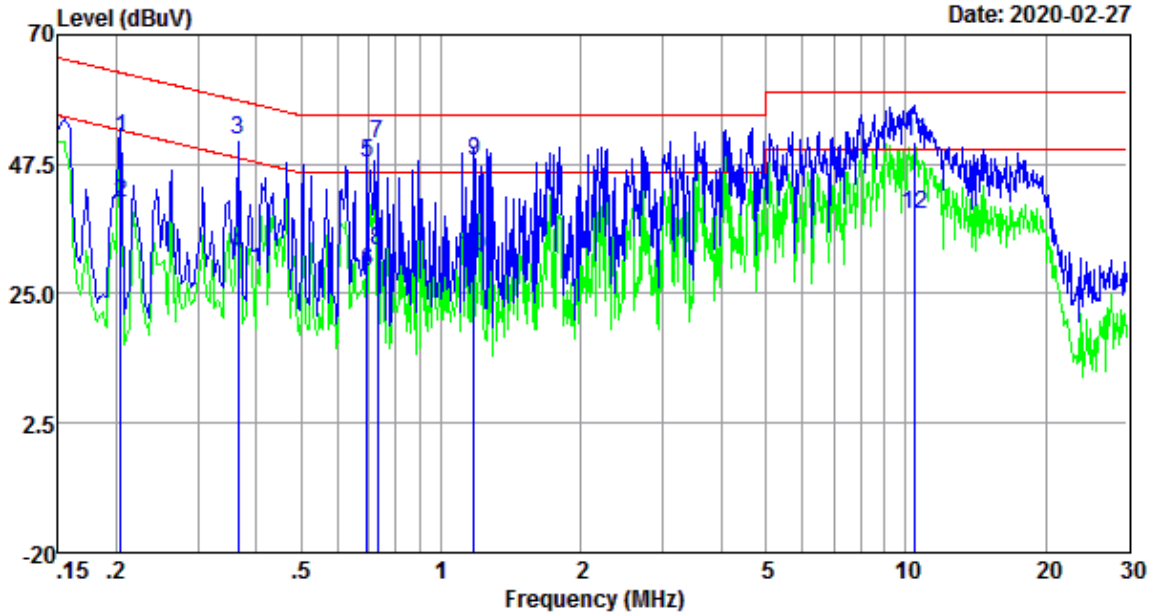
*Decreases with the logarithm of the frequency.

4.5.2 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

4.5.3 Test Result of AC Conducted Emission

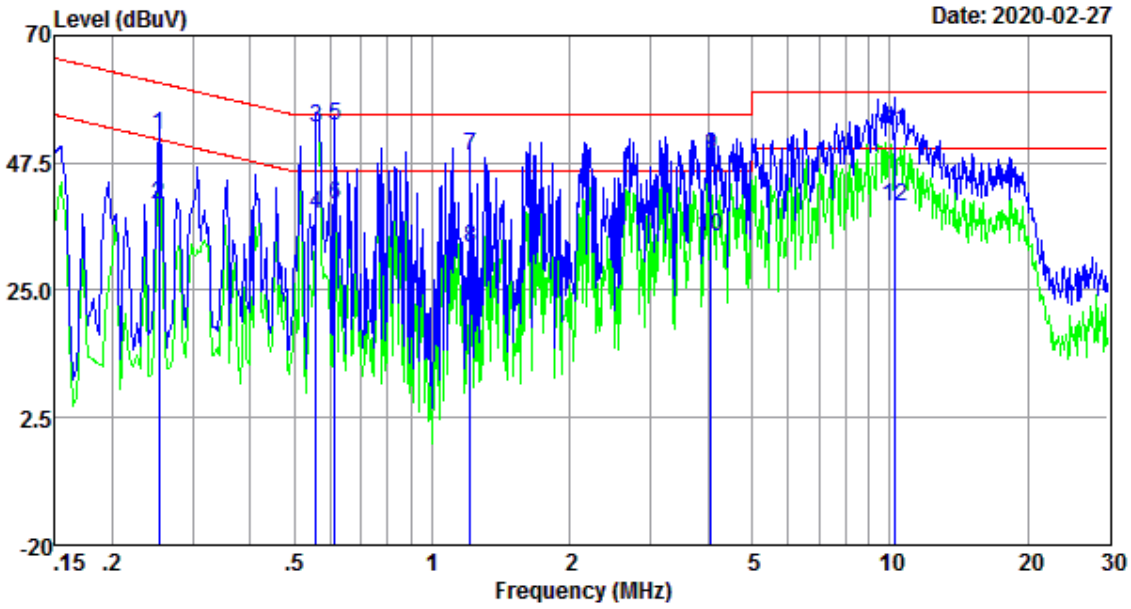
Test Mode :	Mode 1	**Temperature :**	21~23℃
Test Engineer :	Jerry Wang	**Relative Humidity :**	41~43%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	5G WLAN Link + HDMI + TF Card Upload + USB playing		



Freq MHz	Reading level dBuV	LISN/ISN factor dB	Cable loss dB	Result level dBuV	Limit level dBuV	Over limit dB	Remark
0.204	42.40	9.56	0.04	52.00	63.45	-11.45	QP
0.204	31.10	9.56	0.04	40.70	53.45	-12.75	Average
0.365	42.10	9.58	0.04	51.72	58.61	-6.89	QP
0.365	22.30	9.58	0.04	31.92	48.61	-16.69	Average
0.694	38.10	9.59	0.04	47.73	56.00	-8.27	QP
0.694	19.10	9.59	0.04	28.73	46.00	-17.27	Average
0.731	41.30	9.59	0.04	50.93	56.00	-5.07	QP
0.731	22.90	9.59	0.04	32.53	46.00	-13.47	Average
1.178	38.40	9.60	0.05	48.05	56.00	-7.95	QP
1.178	21.90	9.60	0.05	31.55	46.00	-14.45	Average
10.452	41.50	9.95	0.10	51.55	60.00	-8.45	QP
10.452	28.70	9.95	0.10	38.75	50.00	-11.25	Average

Result Level= Reading Level + LISN Factor + Cable Loss

Test Mode :	Mode 1	**Temperature :**	21~23℃
Test Engineer :	Jerry Wang	**Relative Humidity :**	41~43%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Function Type :	5G WLAN Link + HDMI + TF Card Upload + USB playing		



Freq MHz	Reading level dBuV	LISN/ISN factor dB	Cable loss dB	Result level dBuV	Limit level dBuV	Over limit dB	Remark
0.253	42.70	9.55	0.04	52.29	61.64	-9.35	QP
0.253	30.50	9.55	0.04	40.09	51.64	-11.55	Average
0.558	44.10	9.56	0.04	53.70	56.00	-2.30	QP
0.558	28.80	9.56	0.04	38.40	46.00	-7.60	Average
0.614	44.30	9.57	0.04	53.91	56.00	-2.09	QP
0.614	30.40	9.57	0.04	40.01	46.00	-5.99	Average
1.210	39.10	9.57	0.05	48.72	56.00	-7.28	QP
1.210	22.80	9.57	0.05	32.42	46.00	-13.58	Average
4.070	39.21	9.63	0.07	48.91	56.00	-7.09	QP
4.070	24.61	9.63	0.07	34.31	46.00	-11.69	Average
10.288	43.20	9.87	0.10	53.17	60.00	-6.83	QP
10.288	29.70	9.87	0.10	39.67	50.00	-10.33	Average

Result Level= Reading Level + LISN Factor + Cable Loss

4.6 Frequency Stability Measurement

4.6.1 Limit of Frequency Stability

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.

4.6.2 Test Procedures

1. To ensure emission at the band edge is maintained within the authorized band, those values shall be measured by radiation emissions at upper and lower frequency points, and finally compensated by frequency deviation as procedures below.
2. The EUT was operated at the maximum output power, and connected to the spectrum analyzer, which is set to maximum hold function and peak detector. The peak value of the power envelope was measured and noted. The upper and lower frequency points were respectively measured relatively 10dB lower than the measured peak value.
3. The frequency deviation was calculated by adding the upper frequency point and the lower frequency point divided by two. Those detailed values of frequency deviation are provided in table below.

4.6.3 Test Result of Frequency Stability

Refer to Appendix D of this test report.

4.7 Automatically Discontinue Transmission

4.7.1 Limit of Automatically Discontinue Transmission

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 to describe how this requirement is met.

4.7.2 Test Result of Automatically Discontinue Transmission

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 ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

4.8 Antenna Requirements

4.8.1 Standard Applicable

If transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.8.2 Antenna Connected Construction

An PIFA antenna design is used.

4.8.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Due Date	Remark
Spectrum Analyzer	Keysight	N9010A	MY56070788	2020-01-15	2021-01-14	Conducted
Power Sensor	Keysight	U2021XA	MY56510025	2020-01-16	2021-01-15	Conducted
Power Sensor	Keysight	U2021XA	MY57030005	2020-01-16	2021-01-15	Conducted
Power Sensor	Keysight	U2021XA	MY56510018	2020-01-16	2021-01-15	Conducted
Power Sensor	Keysight	U2021XA	MY56480002	2020-01-16	2021-01-15	Conducted
Thermal Chamber	Sanmtest	SMC-408-CD	2435	2019-05-09	2020-05-08	Conducted
Base Station	R&S	CMW 270	101231	2020-01-16	2021-01-15	Conducted
Signal Generator (Interferer)	Keysight	N5182B	MY56200384	2020-02-21	2021-02-20	Conducted
Signal Generator (Blocker)	Keysight	N5171B	MY56200661	2020-01-15	2021-01-14	Conducted

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV 40	101433	2020-01-16	2021-01-15	Radiation
Amplifier	Sonoma	310	363917	2020-01-15	2021-01-14	Radiation
Amplifier	Schwarzbeck	BBV 9718	327	2020-01-15	2021-01-14	Radiation
Amplifier	Narda	TTA1840-35-HG	2034380	2019-05-15	2020-05-14	Radiation
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-051	2020-02-14	2023-02-13	Radiation
Broadband Antenna	Schwarzbeck	VULB 9168	9168-757	2018-08-31	2021-08-30	Radiation
Horn Antenna	Schwarzbeck	BBHA 9120 D	1677	2020-02-14	2023-02-13	Radiation
Horn Antenna	COM-POWER	AH-1840	101117	2018-06-20	2021-06-19	Radiation
Test Software	Audix	E3	6.111221a	N/A	N/A	Radiation
Filter	Micro-Tronics	BRM 50702	G266	N/A	N/A	Radiation

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Due Date	Remark
LISN	R&S	ENV216	102125	2020-01-08	2021-01-07	Conducted
LISN	R&S	ENV432	101327	2020-01-08	2021-01-07	Conducted
EMI Test Receiver	R&S	ESR3	102143	2020-01-16	2021-01-15	Conducted
EMI Test Software	Audix	E3	N/A	N/A	N/A	Conducted

N/A: No Calibration Required

6 Uncertainty of Evaluation

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.67dB
Radiated emissions	30MHz ~ 1GMHz	5.05dB
	1GHz ~ 18GHz	5.06 dB
	18GHz ~ 40GHz	3.65dB

MEASUREMENT	UNCERTAINTY
Occupied Channel Bandwidth	±0.1%
RF output power, conducted	±1.2dB
Power density, conducted	±1.2dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Appendix A1: Emission Bandwidth

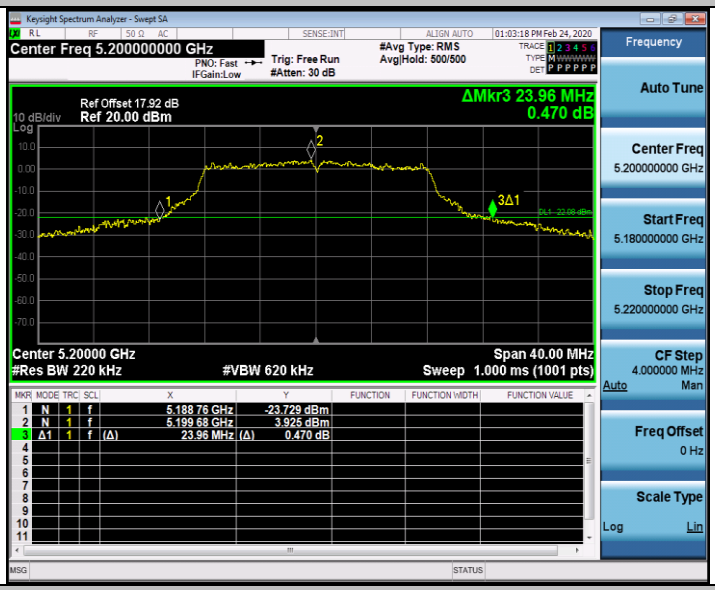
Test Result

TestMode	Antenna	Channel	26db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	23.440	5169.000	5192.440	---	PASS
		5200	23.960	5188.760	5212.720	---	PASS
		5240	26.560	5225.920	5252.480	---	PASS
11N20SISO	Ant1	5180	26.600	5168.640	5195.240	---	PASS
		5200	26.120	5188.080	5214.200	---	PASS
		5240	25.360	5227.360	5252.720	---	PASS
11N40SISO	Ant1	5190	51.440	5168.880	5220.320	---	PASS
		5230	60.560	5198.880	5259.440	---	PASS
11AC20SISO	Ant1	5180	25.600	5167.920	5193.520	---	PASS
		5200	25.600	5187.280	5212.880	---	PASS
		5240	24.560	5227.760	5252.320	---	PASS
11AC40SISO	Ant1	5190	53.280	5167.520	5220.800	---	PASS
		5230	57.440	5200.560	5258.000	---	PASS
11AC80SISO	Ant1	5210	94.080	5169.680	5263.760	---	PASS

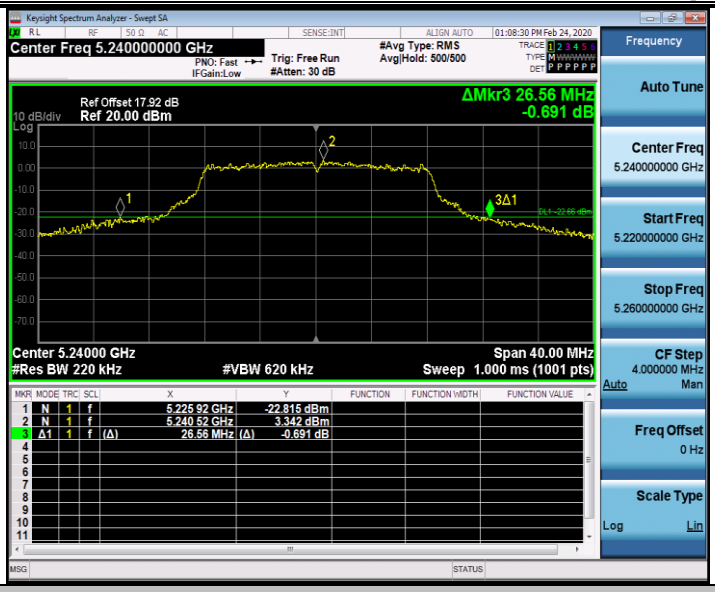
Test Graphs

11A_Ant1_5180

11A_Ant1_5200

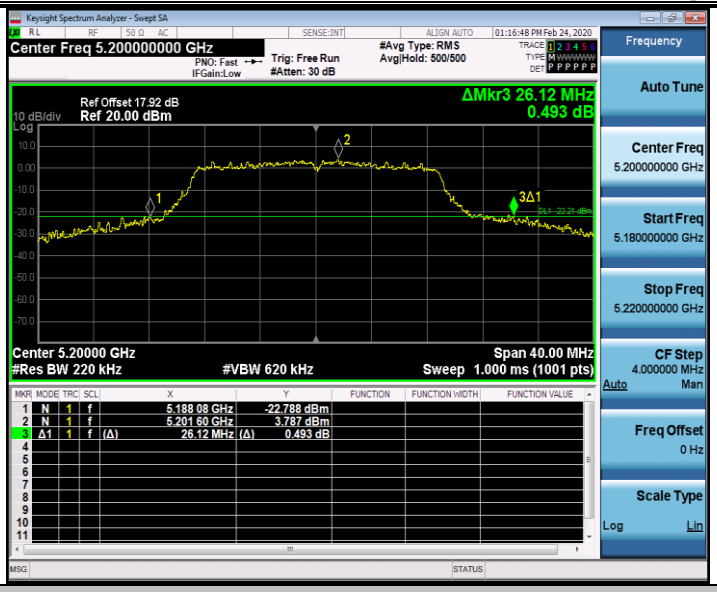


11A_Ant1_5240

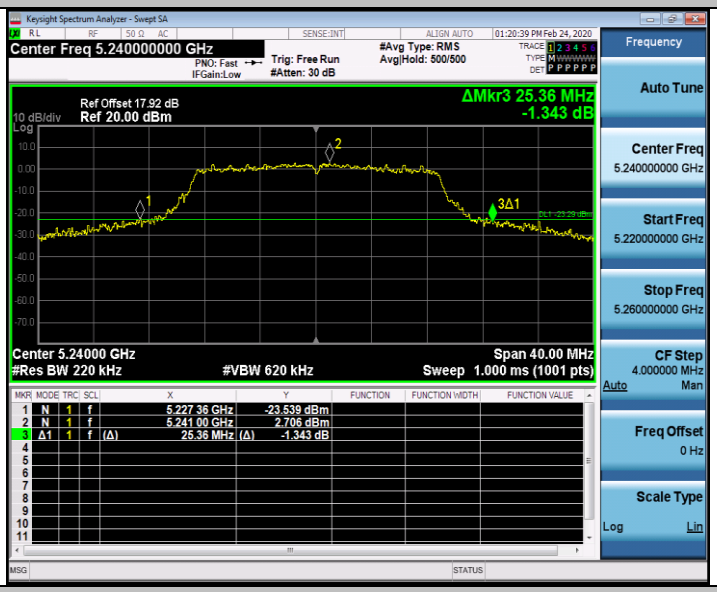


11N20SISO_Ant1_5180

11N20SISO_Ant1_5200

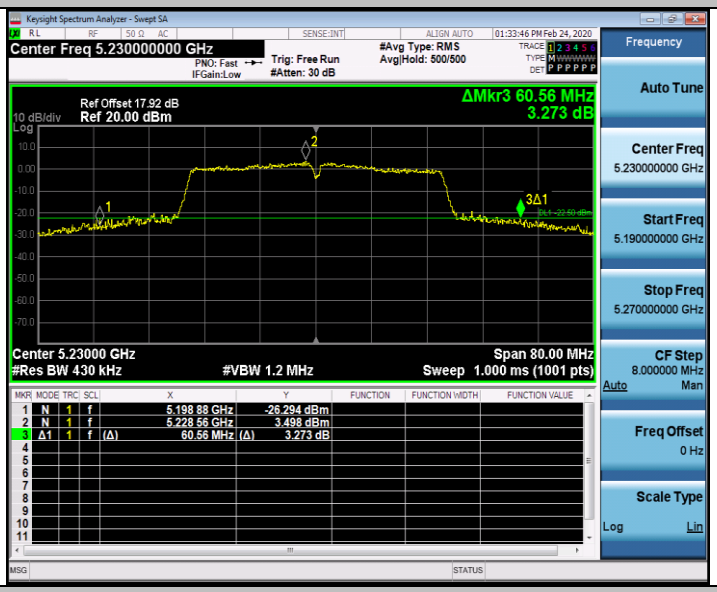


11N20SISO_Ant1_5240

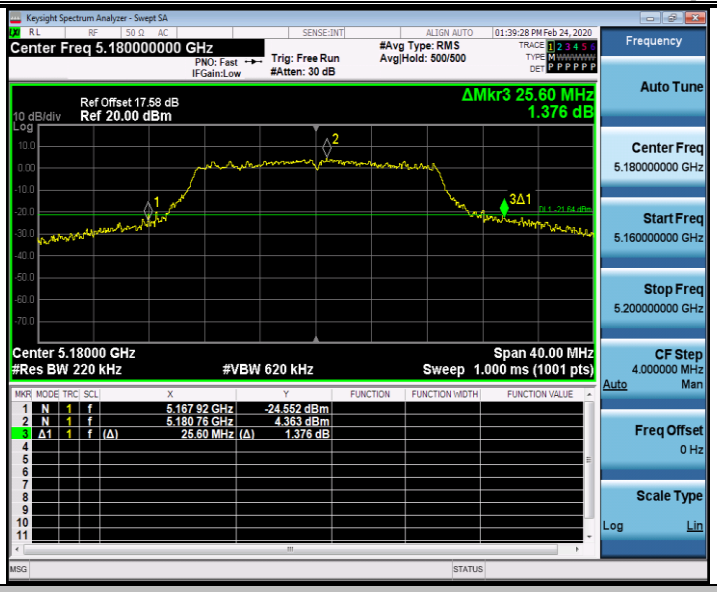


11N40SISO_Ant1_5190

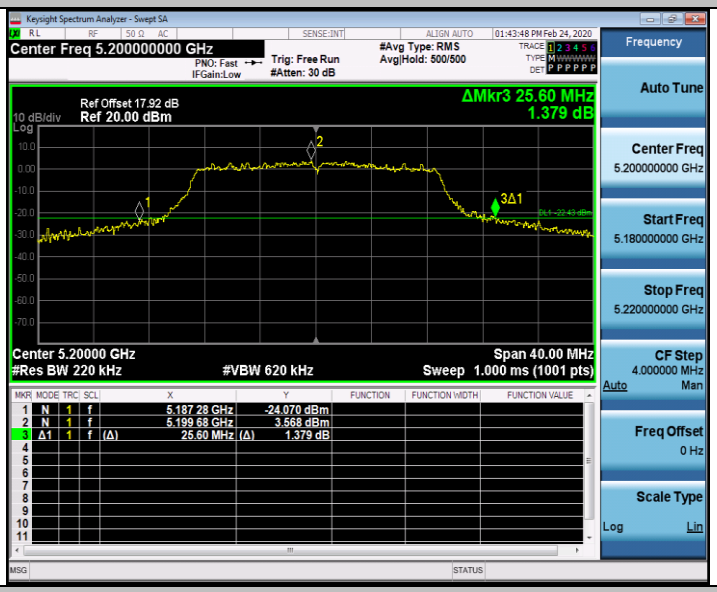
11N40SISO_Ant1_5230



11AC20SISO_Ant1_5180



11AC20SISO_Ant1_5200



11AC20SISO_Ant1_5240

11AC40SISO_Ant1_5190

11AC40SISO_Ant1_5230

11AC80SISO_Ant1_5210

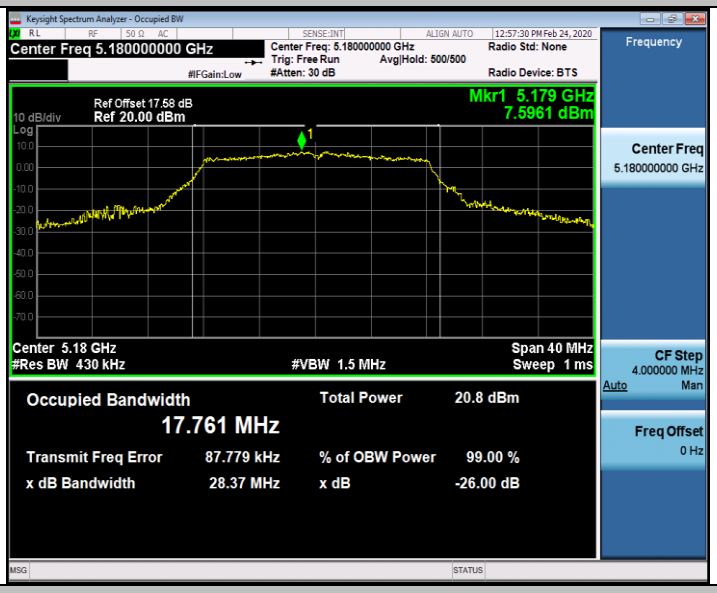
Appendix A2: Occupied channel bandwidth

Test Result

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	17.761	5171.207	5188.968	---	PASS
		5200	17.858	5191.090	5208.948	---	PASS
		5240	17.912	5230.998	5248.910	---	PASS
11N20SISO	Ant1	5180	18.574	5170.843	5189.417	---	PASS
		5200	18.660	5190.763	5209.423	---	PASS
		5240	18.620	5230.743	5249.363	---	PASS
11N40SISO	Ant1	5190	36.847	5171.782	5208.629	---	PASS
		5230	36.893	5211.611	5248.504	---	PASS
11AC20SISO	Ant1	5180	18.536	5170.860	5189.396	---	PASS
		5200	18.595	5190.778	5209.373	---	PASS
		5240	18.669	5230.690	5249.359	---	PASS
11AC40SISO	Ant1	5190	36.850	5171.790	5208.640	---	PASS
		5230	36.936	5211.588	5248.524	---	PASS
11AC80SISO	Ant1	5210	75.847	5172.364	5248.211	---	PASS

Test Graphs

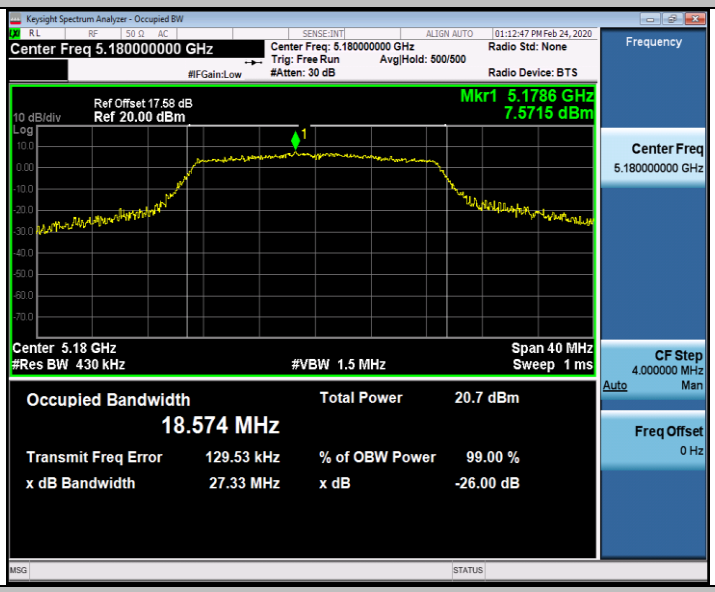
11A_Ant1_5180



11A_Ant1_5200

11A_Ant1_5240

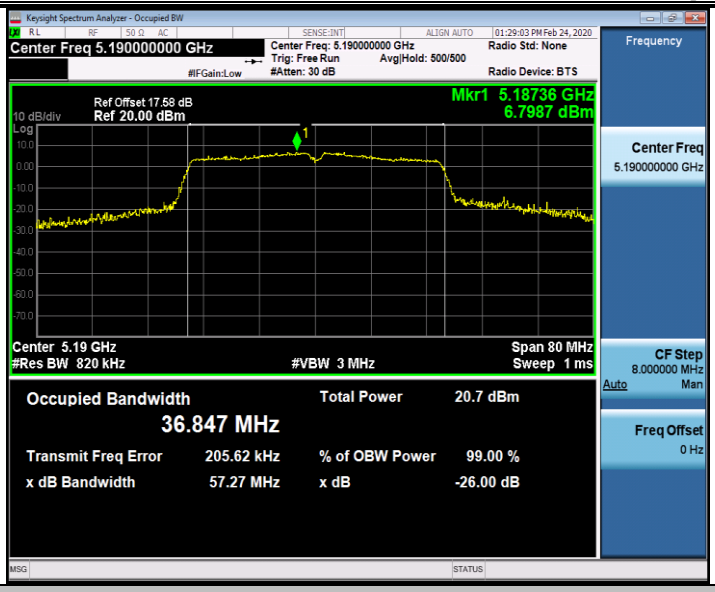
11N20SISO_Ant1_5180



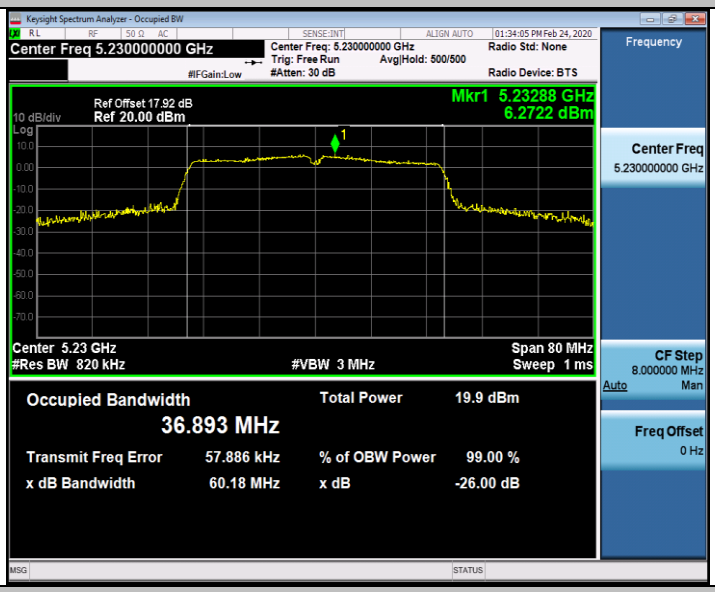
11N20SISO_Ant1_5200

11N20SISO_Ant1_5240

11N40SISO_Ant1_5190



11N40SISO_Ant1_5230

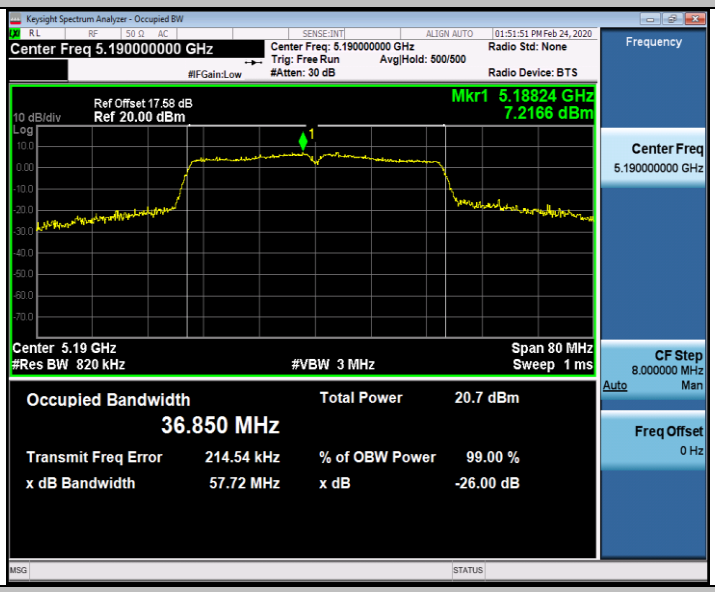


11AC20SISO_Ant1_5180

11AC20SISO_Ant1_5200

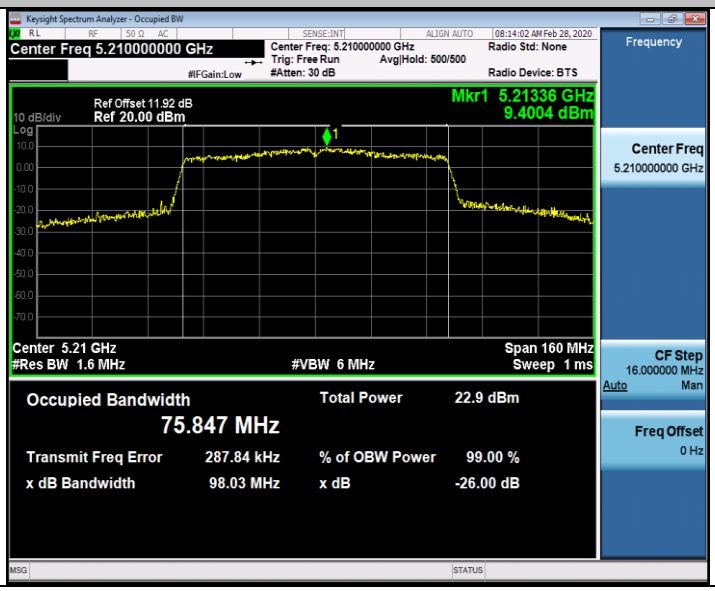
11AC20SISO_Ant1_5240

11AC40SISO_Ant1_5190



11AC40SISO_Ant1_5230

11AC80SISO_Ant1_5210



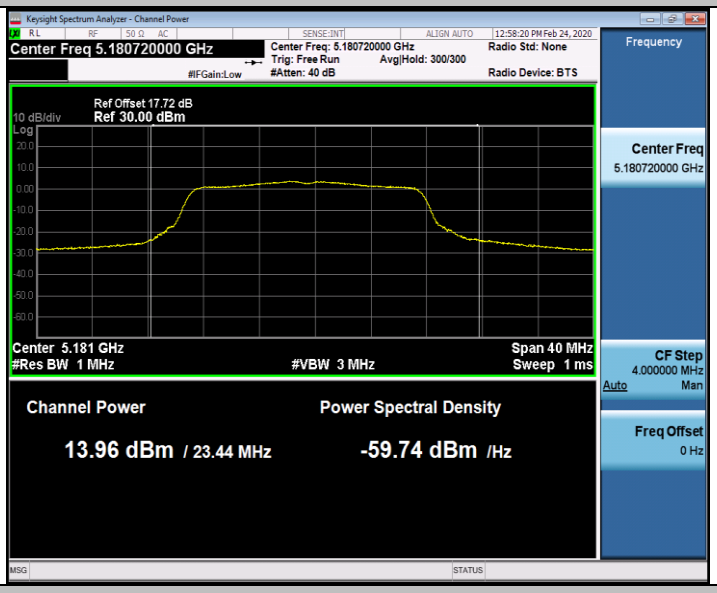
Appendix B: Maximum conducted output power

Test Result

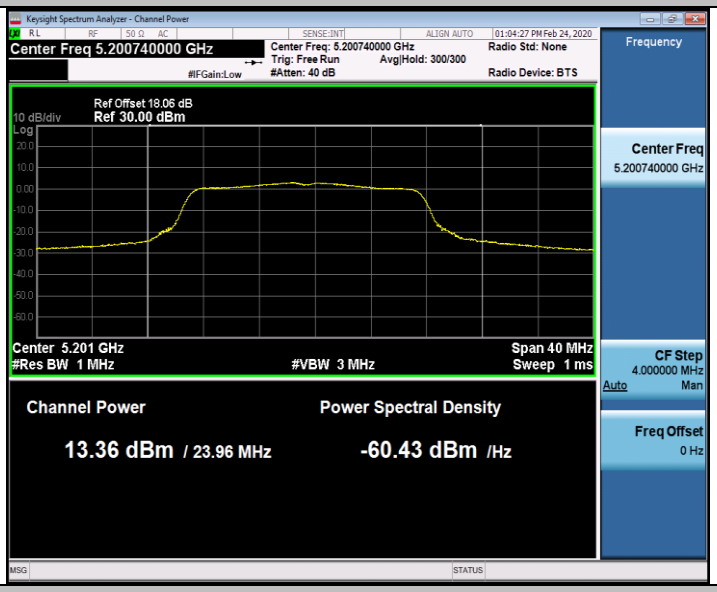
TestMode	Antenna	Frequency	DT (%)	10 log (1/x)	Result[dBm]	Limit[dBm]	Verdict
11A	Ant1	5180	96.92	0.14	13.96	<=23.98	PASS
		5200	96.92	0.14	13.36	<=23.98	PASS
		5240	96.92	0.14	12.66	<=23.98	PASS
11N20SISO	Ant1	5180	96.71	0.15	13.70	<=23.98	PASS
		5200	96.81	0.14	12.99	<=23.98	PASS
		5240	96.72	0.14	12.28	<=23.98	PASS
11N40SISO	Ant1	5190	93.57	0.29	13.24	<=23.98	PASS
		5230	93.76	0.28	12.52	<=23.98	PASS
11AC20SISO	Ant1	5180	96.74	0.14	13.69	<=23.98	PASS
		5200	96.74	0.14	13.03	<=23.98	PASS
		5240	96.74	0.14	12.34	<=23.98	PASS
11AC40SISO	Ant1	5190	93.65	0.28	13.16	<=23.98	PASS
		5230	93.64	0.29	12.63	<=23.98	PASS
11AC80SISO	Ant1	5210	98.44	0.07	13.88	<=23.98	PASS

Test Graphs

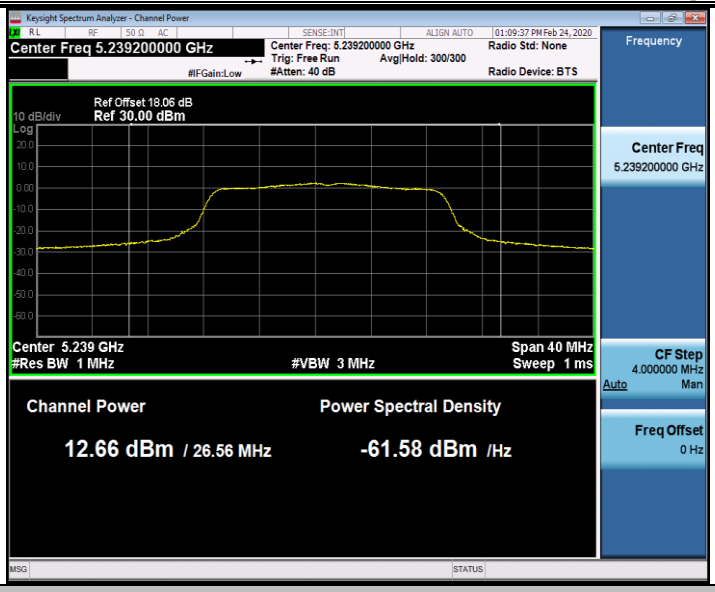
11A_Ant1_5180



11A_Ant1_5200

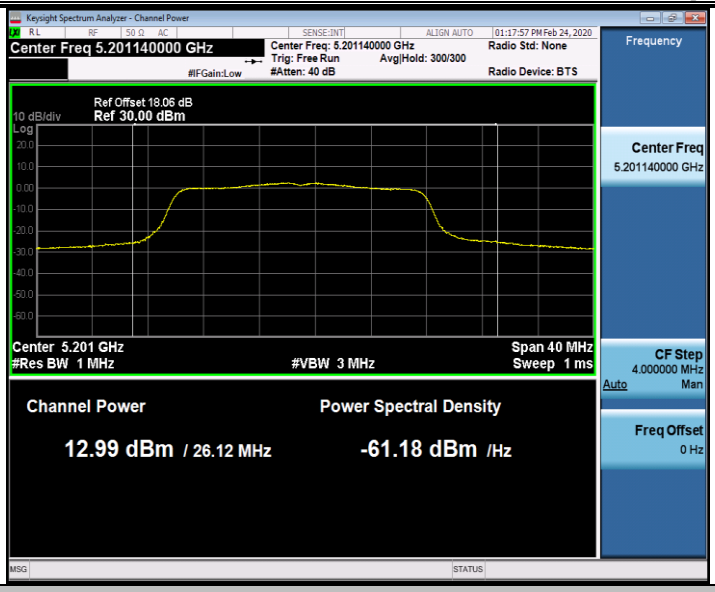


11A_Ant1_5240



11N20SISO_Ant1_5180

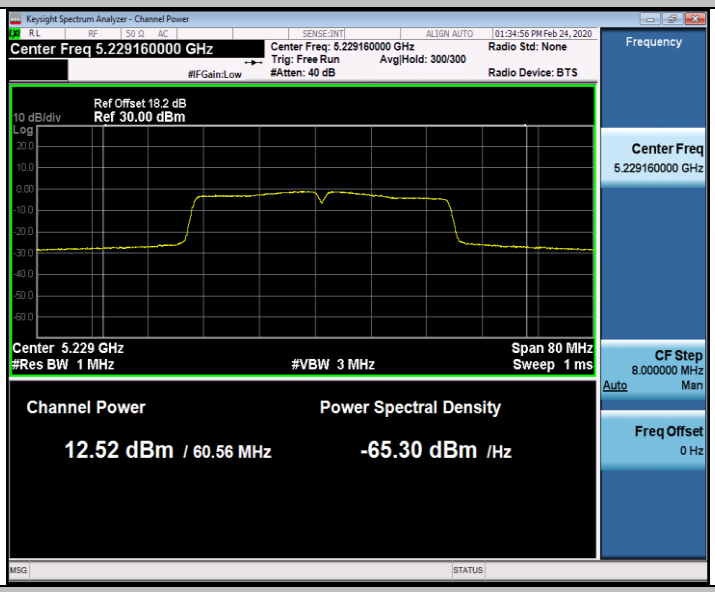
11N20SISO_Ant1_5200



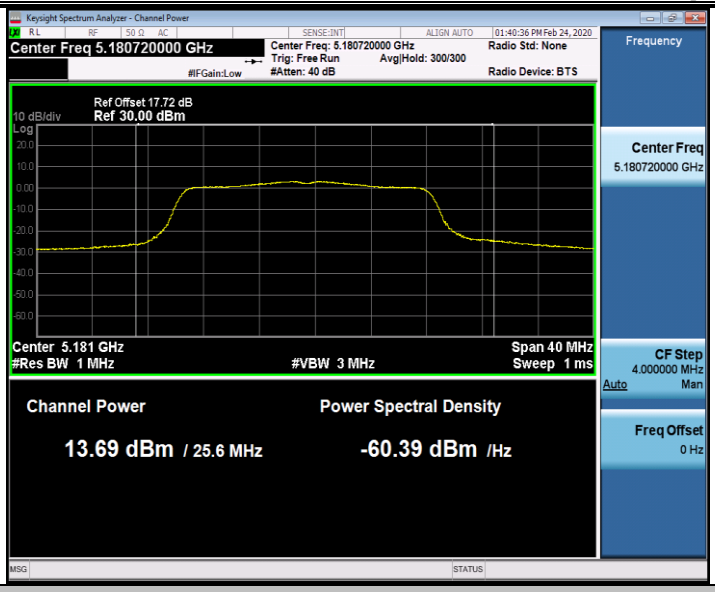
11N20SISO_Ant1_5240

11N40SISO_Ant1_5190

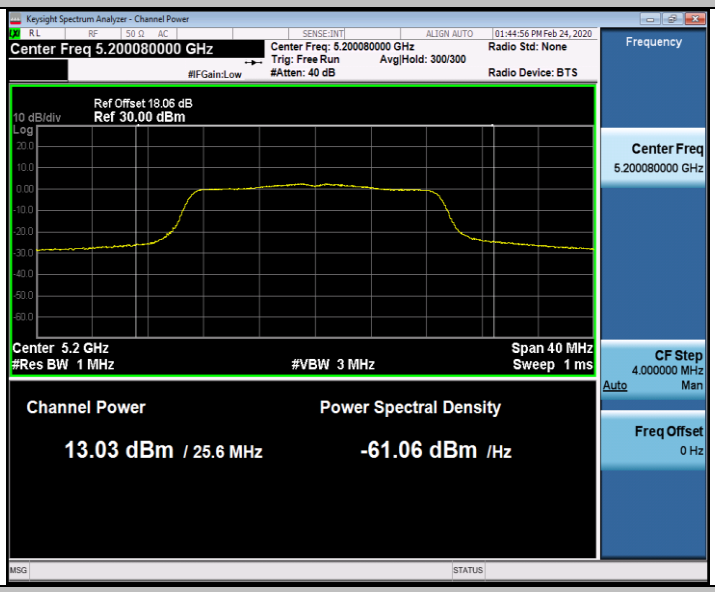
11N40SISO_Ant1_5230



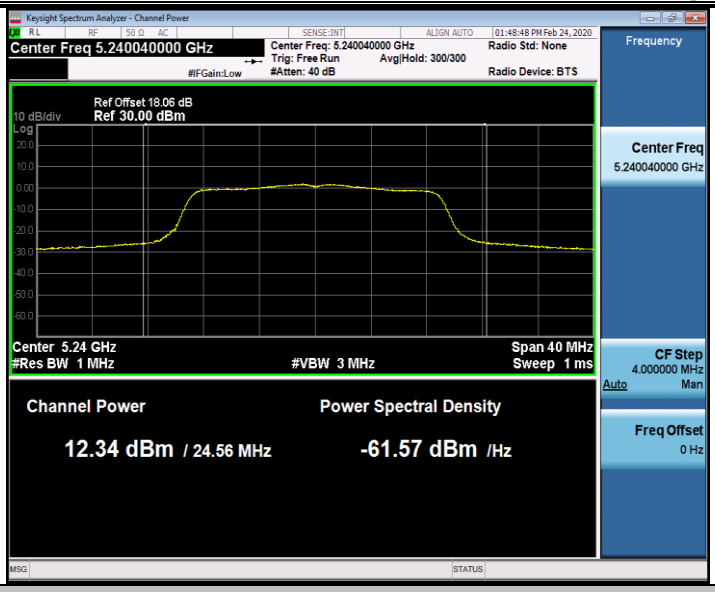
11AC20SISO_Ant1_5180



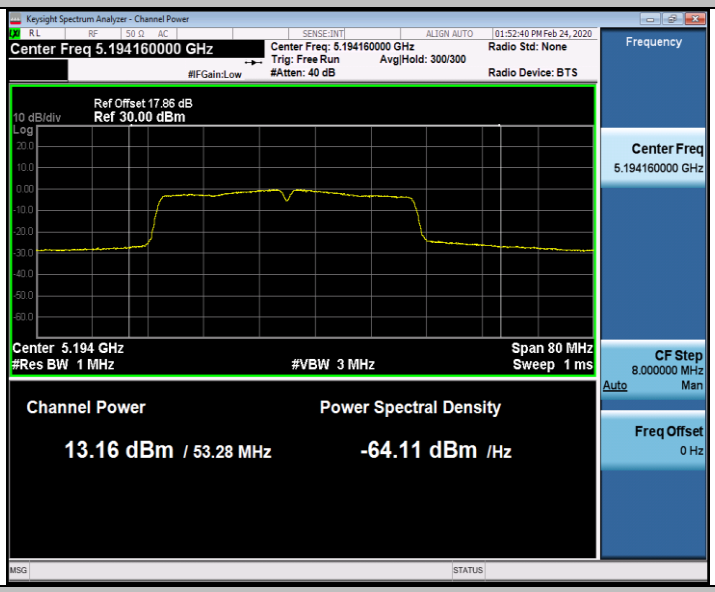
11AC20SISO_Ant1_5200



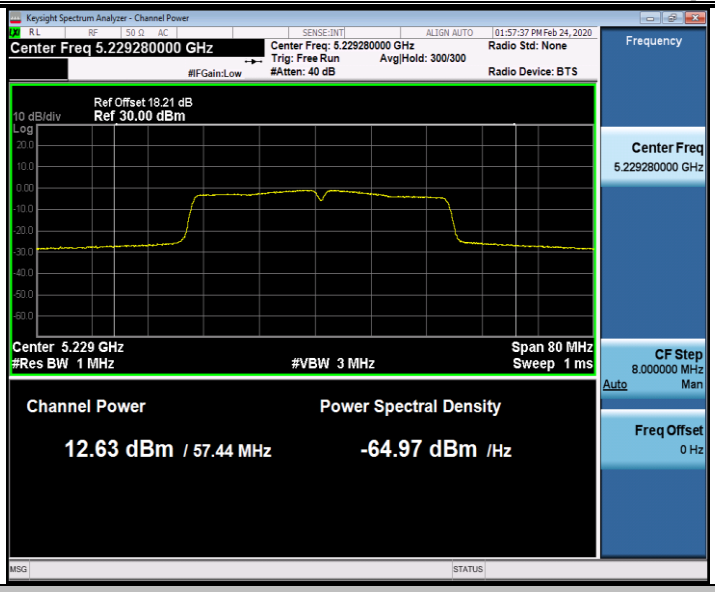
11AC20SISO_Ant1_5240



11AC40SISO_Ant1_5190



11AC40SISO_Ant1_5230



11AC80SISO_Ant1_5210

Appendix C: Maximum power spectral density

Test Result

TestMode	Antenna	Channel	DT (%)	10 log (1/x)	Result [dBm/MHz]	Limit[dBm/MHz]	Verdict
11A	Ant1	5180	96.92	0.14	4.1	<=11	PASS
		5200	96.92	0.14	3.35	<=11	PASS
		5240	96.92	0.14	2.62	<=11	PASS
11N20SISO	Ant1	5180	96.71	0.15	3.59	<=11	PASS
		5200	96.81	0.14	2.71	<=11	PASS
		5240	96.72	0.14	1.88	<=11	PASS
11N40SISO	Ant1	5190	93.57	0.29	-0.14	<=11	PASS
		5230	93.76	0.28	-0.73	<=11	PASS
11AC20SISO	Ant1	5180	96.74	0.14	3.39	<=11	PASS
		5200	96.74	0.14	2.88	<=11	PASS
		5240	96.74	0.14	2.12	<=11	PASS
11AC40SISO	Ant1	5190	93.65	0.28	0.18	<=11	PASS
		5230	93.64	0.29	-0.48	<=11	PASS
11AC80SISO	Ant1	5210	98.44	0.07	-2.13	<=11	PASS

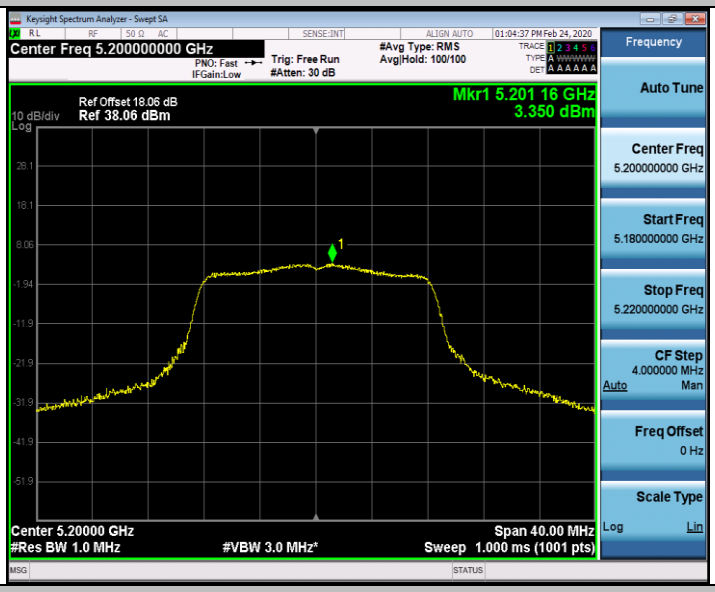
Note：1.The Result and Limit Unit is dBm/500 kHz in the band 5.725–5.85 GHz.

2.The Duty Cycle Factor and RBW Factor is compensated in the graph.

Test Graphs

11A_Ant1_5180

11A_Ant1_5200



11A_Ant1_5240