



3.5 AC Conducted Emission Measurement

3.5.1 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.

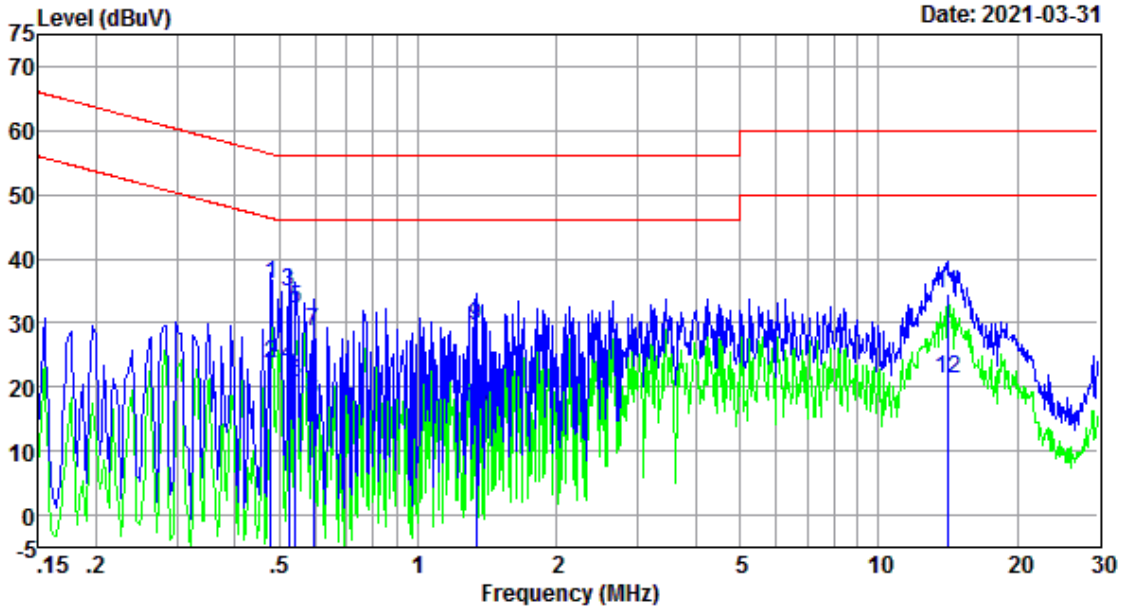
3.5.2 Test Procedures

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.



3.5.3 Test Result of AC Conducted Emission

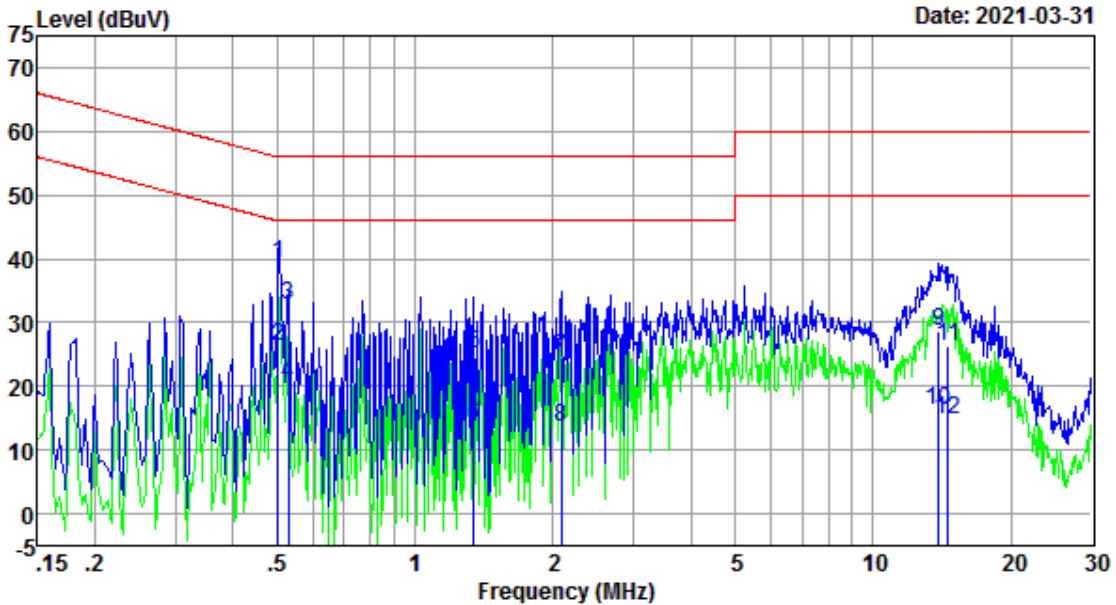
Test Mode :	Mode 1	Temperature :	20°C
Test Engineer :	Jerry.Wang	Relative Humidity :	64%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	RLAN Linking + Earphone + Adapter		



Freq MHz	Reading level dBuV	LISN/ISN factor dB	Cable loss dB	Result level dBuV	Limit level dBuV	Over limit dB	Remark
0.479	26.40	9.58	0.01	35.99	56.36	-20.37	QP
0.479	14.10	9.58	0.01	23.69	46.36	-22.67	Average
0.524	25.30	9.58	0.01	34.89	56.00	-21.11	QP
0.524	13.70	9.58	0.01	23.29	46.00	-22.71	Average
0.541	22.50	9.58	0.01	32.09	56.00	-23.91	QP
0.541	11.10	9.58	0.01	20.69	46.00	-25.31	Average
0.592	19.20	9.58	0.01	28.79	56.00	-27.21	QP
0.592	8.50	9.58	0.01	18.09	46.00	-27.91	Average
1.338	19.91	9.58	0.02	29.51	56.00	-26.49	QP
1.338	6.81	9.58	0.02	16.41	46.00	-29.59	Average
14.138	24.50	9.92	0.10	34.52	60.00	-25.48	QP
14.138	11.20	9.92	0.10	21.22	50.00	-28.78	Average



Test Mode :	Mode 1	Temperature :	20°C
Test Engineer :	Jerry.Wang	Relative Humidity :	64%
Test Voltage :	120Vac / 60Hz	Phase :	NEUTRAL
Function Type :	RLAN Linking + Earphone + Adapter		



Freq MHz	Reading level dBuV	LISN/ISN factor dB	Cable loss dB	Result level dBuV	Limit level dBuV	Over limit dB	Remark
0.502	29.70	9.57	0.01	39.28	56.00	-16.72	QP
0.502	16.80	9.57	0.01	26.38	46.00	-19.62	Average
0.529	23.20	9.57	0.01	32.78	56.00	-23.22	QP
0.529	10.80	9.57	0.01	20.38	46.00	-25.62	Average
1.345	15.50	9.58	0.02	25.10	56.00	-30.90	QP
1.345	4.40	9.58	0.02	14.00	46.00	-32.00	Average
2.088	14.90	9.59	0.03	24.52	56.00	-31.48	QP
2.088	4.00	9.59	0.03	13.62	46.00	-32.38	Average
13.915	18.60	9.95	0.10	28.65	60.00	-31.35	QP
13.915	6.20	9.95	0.10	16.25	50.00	-33.75	Average
14.594	16.30	9.97	0.10	26.37	60.00	-33.63	QP
14.594	4.70	9.97	0.10	14.77	50.00	-35.23	Average



3.6 Frequency Stability Measurement

3.6.1 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.

3.6.2 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.



3.6.3 Test Result of Frequency Stability

Refer to Appendix D of this test report.

3.7 Automatically Discontinue Transmission

3.7.1 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.

3.7.2 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.

3.8 Antenna Requirements

3.8.1 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.

3.8.2 Antenna Connected Construction

An LDS type antenna design is used.

3.8.3 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.



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Due Date	Remark
Spectrum Analyzer	Keysight	N9010A	MY56070788	2021-01-05	2022-01-04	Conducted
Power Sensor	Keysight	U2021XA	MY56510025	2021-01-05	2022-01-04	Conducted
Power Sensor	Keysight	U2021XA	MY57030005	2021-01-05	2022-01-04	Conducted
Power Sensor	Keysight	U2021XA	MY56510018	2021-01-05	2022-01-04	Conducted
Power Sensor	Keysight	U2021XA	MY56480002	2021-01-05	2022-01-04	Conducted
Thermal Chamber	Howkin	UHL-34	19111801	2020-05-09	2021-05-08	Conducted
Base Station	R&S	CMW 270	101231	2021-01-05	2022-01-04	Conducted
Signal Generator (Interferer)	Keysight	N5182B	MY56200384	2021-01-05	2022-01-04	Conducted
Signal Generator (Blocker)	Keysight	N5171B	MY56200661	2021-01-05	2022-01-04	Conducted

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV 40	101433	2021-01-05	2022-01-04	Radiation
Amplifier	Sonoma	310	363917	2021-01-06	2022-01-05	Radiation
Amplifier	Schwarzbeck	BBV 9718	327	2021-01-06	2022-01-05	Radiation
Amplifier	Narda	TTA1840-35-HG	2034380	2020-05-14	2021-05-15	Radiation
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-051	2020-02-14	2023-02-13	Radiation
Broadband Antenna	Schwarzbeck	VULB 9168	9168-757	2020-09-27	2023-09-26	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	2021-01-05	2022-01-04	Conducted
LISN	R&S	ENV432	101327	2021-01-06	2022-01-05	Conducted
EMI Test Receiver	R&S	ESR3	102143	2021-01-06	2022-01-05	Conducted
EMI Test Software	Audix	E3	N/A	N/A	N/A	Conducted

N/A: No Calibration Required



5 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	2.42dB
Radiated emissions	30MHz ~ 1GMHz	2.50dB
	1GHz ~ 18GHz	3.51dB
	18GHz ~ 40GHz	3.96dB

MEASUREMENT	UNCERTAINTY
Occupied Channel Bandwidth	±196.4Hz
RF output power, conducted	±2.31dB
Power density, conducted	±2.31dB

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	25.480	5168.280	5193.760	---	PASS
		5200	26.840	5188.200	5215.040	---	PASS
		5240	27.120	5228.160	5255.280	---	PASS
		5260	29.120	5246.840	5275.960	---	PASS
		5280	28.240	5266.880	5295.120	---	PASS
		5320	25.560	5308.240	5333.800	---	PASS
		5500	28.800	5487.040	5515.840	---	PASS
		5580	30.000	5565.880	5595.880	---	PASS
		5700	29.640	5685.760	5715.400	---	PASS
		5745	27.480	5731.800	5759.280	---	PASS
		5785	28.640	5771.400	5800.040	---	PASS
		5825	29.520	5811.400	5840.920	---	PASS
11N20SISO	Ant1	5180	24.720	5168.080	5192.800	---	PASS
		5200	24.880	5188.040	5212.920	---	PASS
		5240	24.120	5228.720	5252.840	---	PASS
		5260	26.480	5247.600	5274.080	---	PASS
		5280	26.600	5267.600	5294.200	---	PASS
		5320	24.800	5308.080	5332.880	---	PASS
		5500	26.720	5487.480	5514.200	---	PASS
		5580	27.680	5566.560	5594.240	---	PASS
		5700	27.000	5687.120	5714.120	---	PASS
		5745	28.360	5731.680	5760.040	---	PASS
		5785	28.640	5771.400	5800.040	---	PASS
		5825	26.840	5812.320	5839.160	---	PASS
11N40SISO	Ant1	5190	55.040	5168.400	5223.440	---	PASS
		5230	55.360	5208.160	5263.520	---	PASS
		5270	55.840	5248.000	5303.840	---	PASS
		5310	41.840	5288.960	5330.800	---	PASS
		5510	42.560	5488.800	5531.360	---	PASS
		5550	65.680	5522.080	5587.760	---	PASS
		5670	41.840	5648.720	5690.560	---	PASS
		5755	55.440	5733.320	5788.760	---	PASS
		5795	54.400	5773.800	5828.200	---	PASS



11AC20SISO	Ant1	5180	24.160	5168.760	5192.920	---	PASS
		5200	24.520	5188.720	5213.240	---	PASS
		5240	25.760	5228.000	5253.760	---	PASS
		5260	26.200	5248.040	5274.240	---	PASS
		5280	25.480	5267.720	5293.200	---	PASS
		5320	25.160	5307.680	5332.840	---	PASS
		5500	28.560	5487.680	5516.240	---	PASS
		5580	27.920	5567.080	5595.000	---	PASS
		5700	27.000	5687.160	5714.160	---	PASS
		5745	27.640	5731.440	5759.080	---	PASS
		5785	27.600	5771.440	5799.040	---	PASS
		5825	28.000	5812.040	5840.040	---	PASS
11AC40SISO	Ant1	5190	42.000	5168.480	5210.480	---	PASS
		5230	49.840	5208.240	5258.080	---	PASS
		5270	49.440	5248.640	5298.080	---	PASS
		5310	47.200	5288.320	5335.520	---	PASS
		5510	42.240	5488.320	5530.560	---	PASS
		5550	55.600	5527.920	5583.520	---	PASS
		5670	55.360	5648.160	5703.520	---	PASS
		5755	47.360	5733.880	5781.240	---	PASS
		5795	49.200	5773.960	5823.160	---	PASS
11AC80SISO	Ant1	5210	83.840	5167.600	5251.440	---	PASS
		5290	84.480	5247.120	5331.600	---	PASS
		5530	84.640	5486.800	5571.440	---	PASS
		5610	84.160	5567.120	5651.280	---	PASS
		5775	84.160	5732.120	5816.280	---	PASS



Test Graphs

11A_Ant1_5180



11A_Ant1_5200



11A_Ant1_5240



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11A_Ant1_5260



11A_Ant1_5280





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11A_Ant1_5320



11A_Ant1_5500



11A_Ant1_5580



11A_Ant1_5700



11A_Ant1_5745





11A_Ant1_5785



11A_Ant1_5825



11N20SISO_Ant1_5180



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Test Report No.: RFW7L-P21040029-6



11N20SISO_Ant1_5200



11N20SISO_Ant1_5240





11N20SISO_Ant1_5260



11N20SISO_Ant1_5280

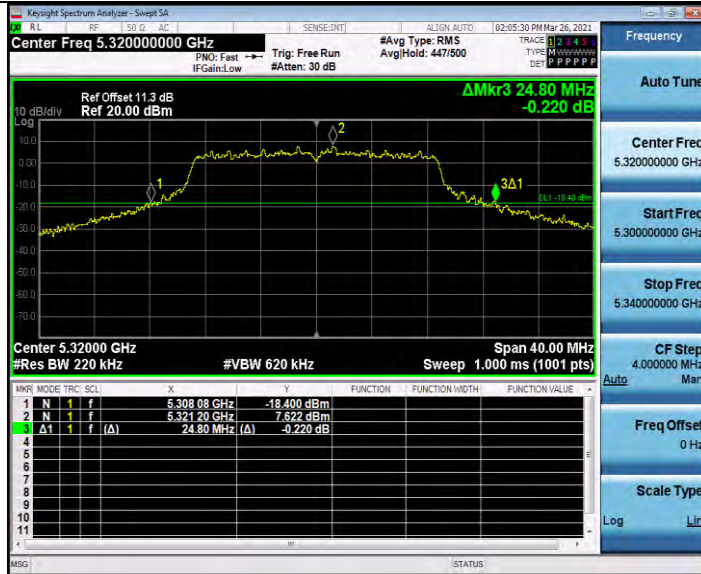


11N20SISO_Ant1_5320



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Test Report No.: RFW7L-P21040029-6



11N20SISO_Ant1_5500



11N20SISO_Ant1_5580





BUREAU VERITAS

Test Report No.: RFW7L-P21040029-6

11N20SISO_Ant1_5700



11N20SISO_Ant1_5745



11N20SISO_Ant1_5785



BUREAU VERITAS

Test Report No.: RFW7L-P21040029-6



11N20SISO_Ant1_5825



11N40SISO_Ant1_5190





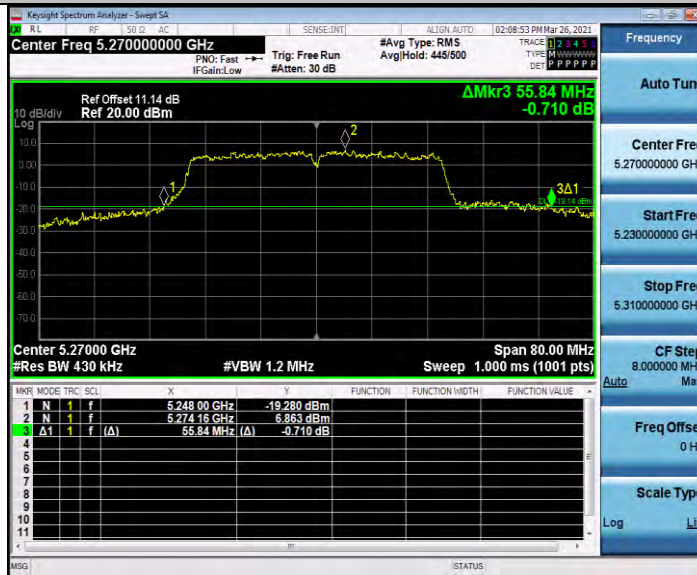
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11N40SISO_Ant1_5270



11N40SISO_Ant1_5310



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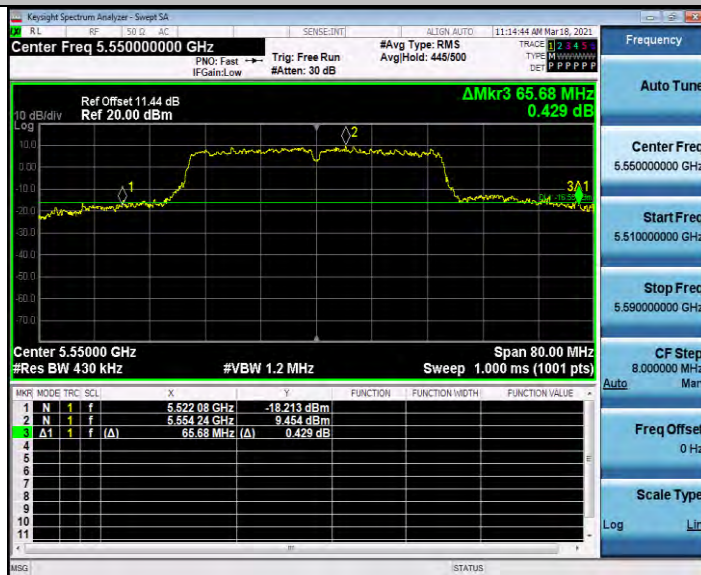
Test Report No.: RFW7L-P21040029-6



11N40SISO_Ant1_5510



11N40SISO_Ant1_5550





11N40SISO_Ant1_5670



11N40SISO_Ant1_5755



11N40SISO_Ant1_5795



11AC20SISO_Ant1_5180



11AC20SISO_Ant1_5200





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11AC20SISO_Ant1_5240



11AC20SISO_Ant1_5260



11AC20SISO_Ant1_5280



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Test Report No.: RFW7L-P21040029-6



11AC20SISO_Ant1_5320



11AC20SISO_Ant1_5500





BUREAU VERITAS

Test Report No.: RFW7L-P21040029-6

11AC20SISO_Ant1_5580



11AC20SISO_Ant1_5700



11AC20SISO_Ant1_5745



BUREAU VERITAS

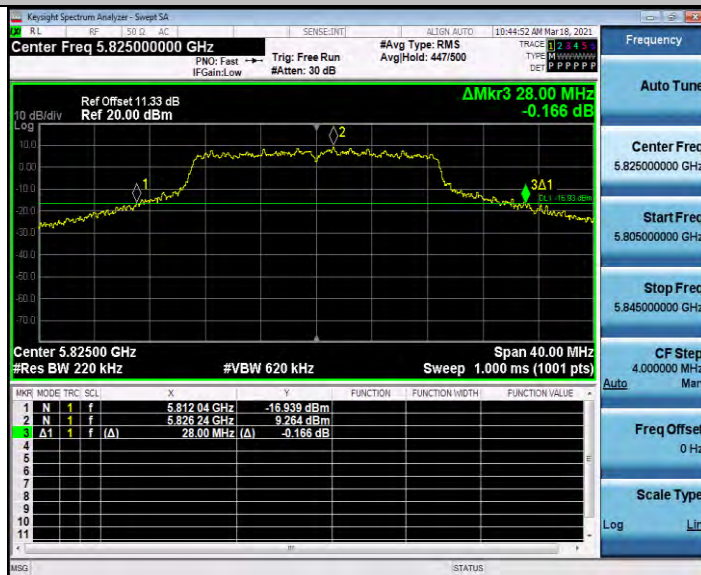
Test Report No.: RFW7L-P21040029-6



11AC20SISO_Ant1_5785



11AC20SISO_Ant1_5825





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Test Report No.: RFW7L-P21040029-6

11AC40SISO_Ant1_5190



11AC40SISO_Ant1_5230

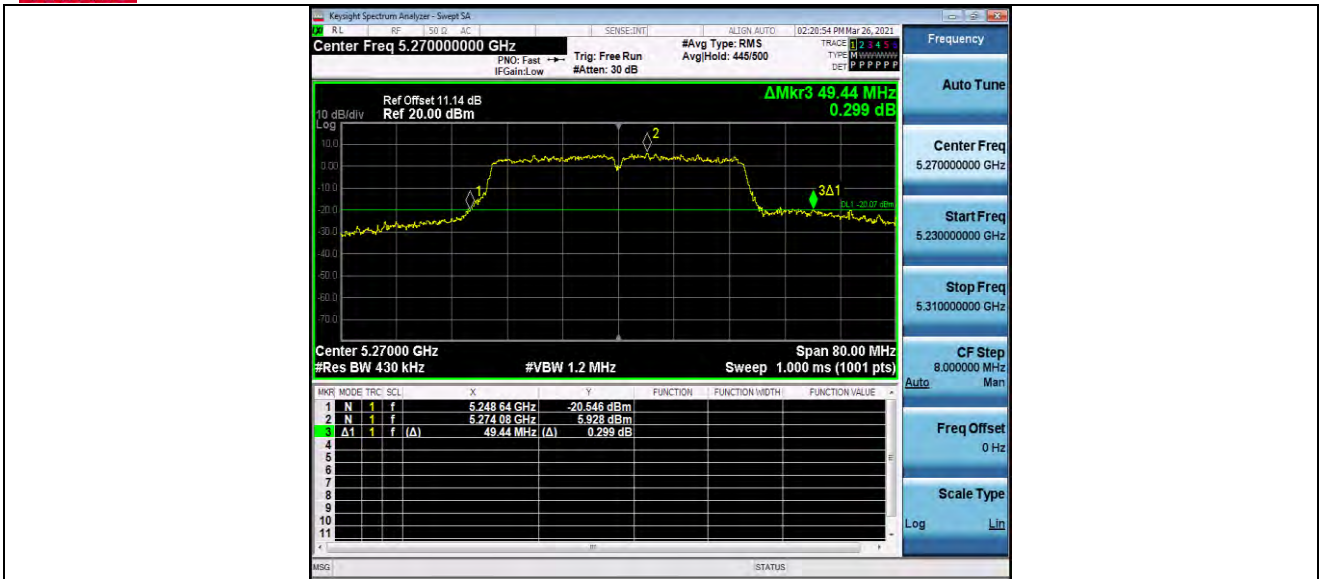


11AC40SISO_Ant1_5270

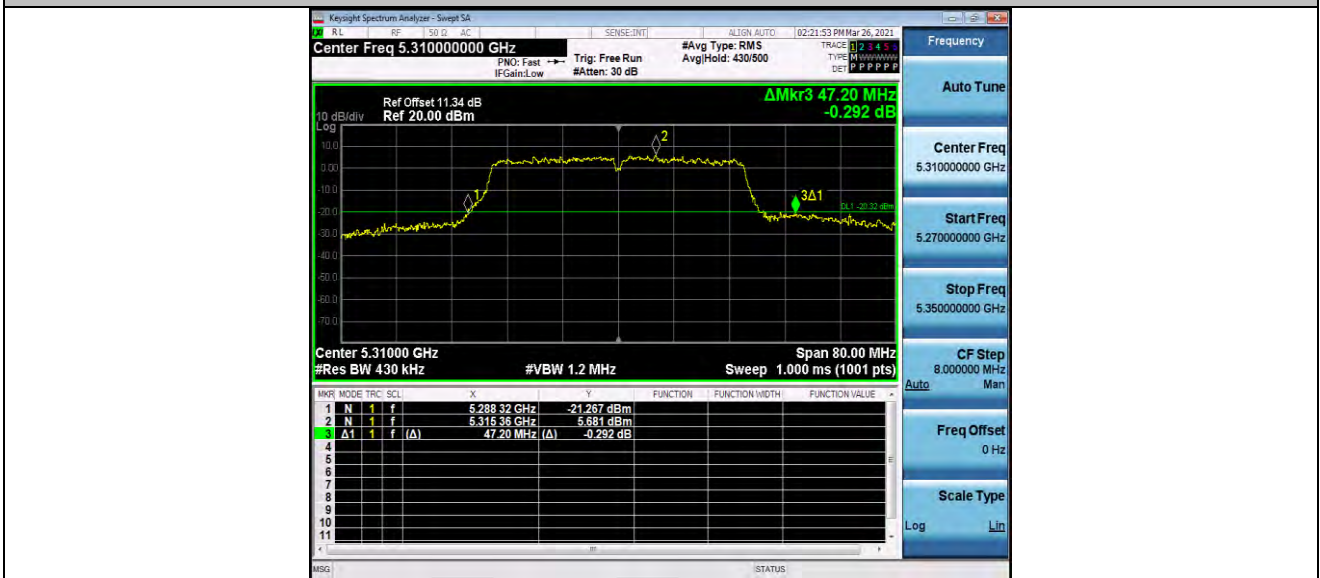


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Test Report No.: RFW7L-P21040029-6



11AC40SISO_Ant1_5310



11AC40SISO_Ant1_5510





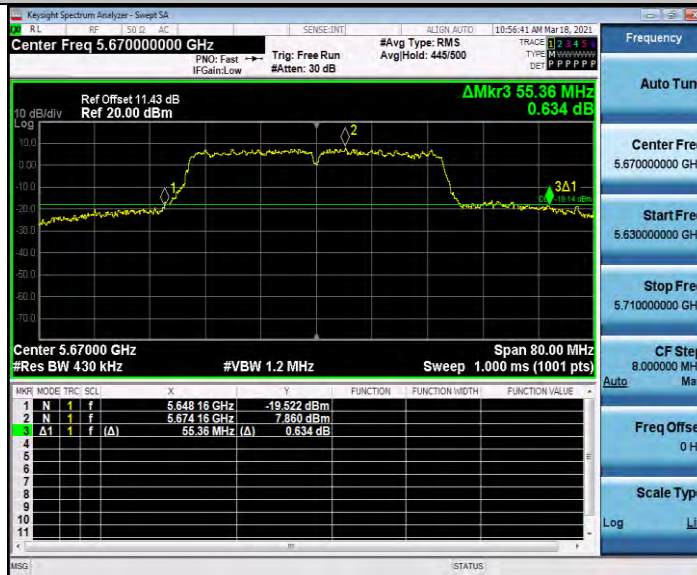
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Test Report No.: RFW7L-P21040029-6

11AC40SISO_Ant1_5550



11AC40SISO_Ant1_5670



11AC40SISO_Ant1_5755



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Test Report No.: RFW7L-P21040029-6



11AC40SISO_Ant1_5795



11AC80SISO_Ant1_5210





11AC80SISO_Ant1_5290



11AC80SISO_Ant1_5530



11AC80SISO_Ant1_5610



11AC80SISO_Ant1_5775





Appendix A2: Occupied channel bandwidth

Test Result

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	17.521	5171.313	5188.834	---	PASS
		5200	17.581	5191.300	5208.881	---	PASS
		5240	17.789	5231.267	5249.056	---	PASS
		5260	17.888	5251.233	5269.121	---	PASS
		5280	17.853	5271.209	5289.062	---	PASS
		5320	17.464	5311.275	5328.739	---	PASS
		5500	18.862	5491.177	5510.039	---	PASS
		5580	18.110	5571.098	5589.208	---	PASS
		5700	17.536	5691.201	5708.737	---	PASS
		5745	17.663	5736.163	5753.826	---	PASS
		5785	17.574	5776.227	5793.801	---	PASS
		5825	18.145	5816.070	5834.215	---	PASS
11N20SISO	Ant1	5180	18.177	5170.920	5189.097	---	PASS
		5200	18.294	5190.908	5209.202	---	PASS
		5240	18.344	5230.911	5249.255	---	PASS
		5260	18.414	5250.862	5269.276	---	PASS
		5280	18.466	5270.826	5289.292	---	PASS
		5320	18.231	5310.893	5329.124	---	PASS
		5500	18.740	5490.860	5509.600	---	PASS
		5580	18.675	5570.745	5589.420	---	PASS
		5700	18.609	5690.699	5709.308	---	PASS
		5745	18.817	5735.708	5754.525	---	PASS
		5785	18.689	5775.762	5794.451	---	PASS
		5825	18.709	5815.755	5834.464	---	PASS
11N40SISO	Ant1	5190	36.700	5171.696	5208.396	---	PASS
		5230	36.776	5211.695	5248.471	---	PASS
		5270	36.832	5251.642	5288.474	---	PASS
		5310	36.469	5291.754	5328.223	---	PASS
		5510	36.497	5491.763	5528.260	---	PASS
		5550	36.981	5531.603	5568.584	---	PASS
		5670	36.667	5651.646	5688.313	---	PASS
		5755	36.789	5736.628	5773.417	---	PASS
		5795	36.710	5776.692	5813.402	---	PASS



11AC20SISO	Ant1	5180	18.183	5170.930	5189.113	---	PASS
		5200	18.250	5190.917	5209.167	---	PASS
		5240	18.328	5230.887	5249.215	---	PASS
		5260	18.397	5250.888	5269.285	---	PASS
		5280	18.394	5270.842	5289.236	---	PASS
		5320	18.264	5310.874	5329.138	---	PASS
		5500	18.843	5490.838	5509.681	---	PASS
		5580	18.757	5570.711	5589.468	---	PASS
		5700	18.462	5690.753	5709.215	---	PASS
		5745	18.718	5735.732	5754.450	---	PASS
		5785	18.745	5775.734	5794.479	---	PASS
		5825	18.734	5815.735	5834.469	---	PASS
11AC40SISO	Ant1	5190	36.503	5171.731	5208.234	---	PASS
		5230	36.585	5211.720	5248.305	---	PASS
		5270	36.525	5251.735	5288.260	---	PASS
		5310	36.519	5291.700	5328.219	---	PASS
		5510	36.429	5491.791	5528.220	---	PASS
		5550	36.680	5531.664	5568.344	---	PASS
		5670	36.718	5651.636	5688.354	---	PASS
		5755	36.531	5736.708	5773.239	---	PASS
		5795	36.588	5776.694	5813.282	---	PASS
11AC80SISO	Ant1	5210	75.902	5172.071	5247.973	---	PASS
		5290	75.837	5252.012	5327.849	---	PASS
		5530	75.761	5492.055	5567.816	---	PASS
		5610	75.995	5571.881	5647.876	---	PASS
		5775	75.958	5736.882	5812.840	---	PASS



Test Graphs

11A_Ant1_5180



11A_Ant1_5200





11A_Ant1_5240



11A_Ant1_5260





11A_Ant1_5280



11A_Ant1_5320





11A_Ant1_5500



11A_Ant1_5580





11A_Ant1_5700



11A_Ant1_5745





11A_Ant1_5785



11A_Ant1_5825





11N20SISO_Ant1_5180



11N20SISO_Ant1_5200





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Test Report No.: RFW7L-P21040029-6

11N20SISO_Ant1_5240



11N20SISO_Ant1_5260





11N20SISO_Ant1_5280



11N20SISO_Ant1_5320





11N20SISO_Ant1_5500



11N20SISO_Ant1_5580





11N20SISO_Ant1_5700



11N20SISO_Ant1_5745

