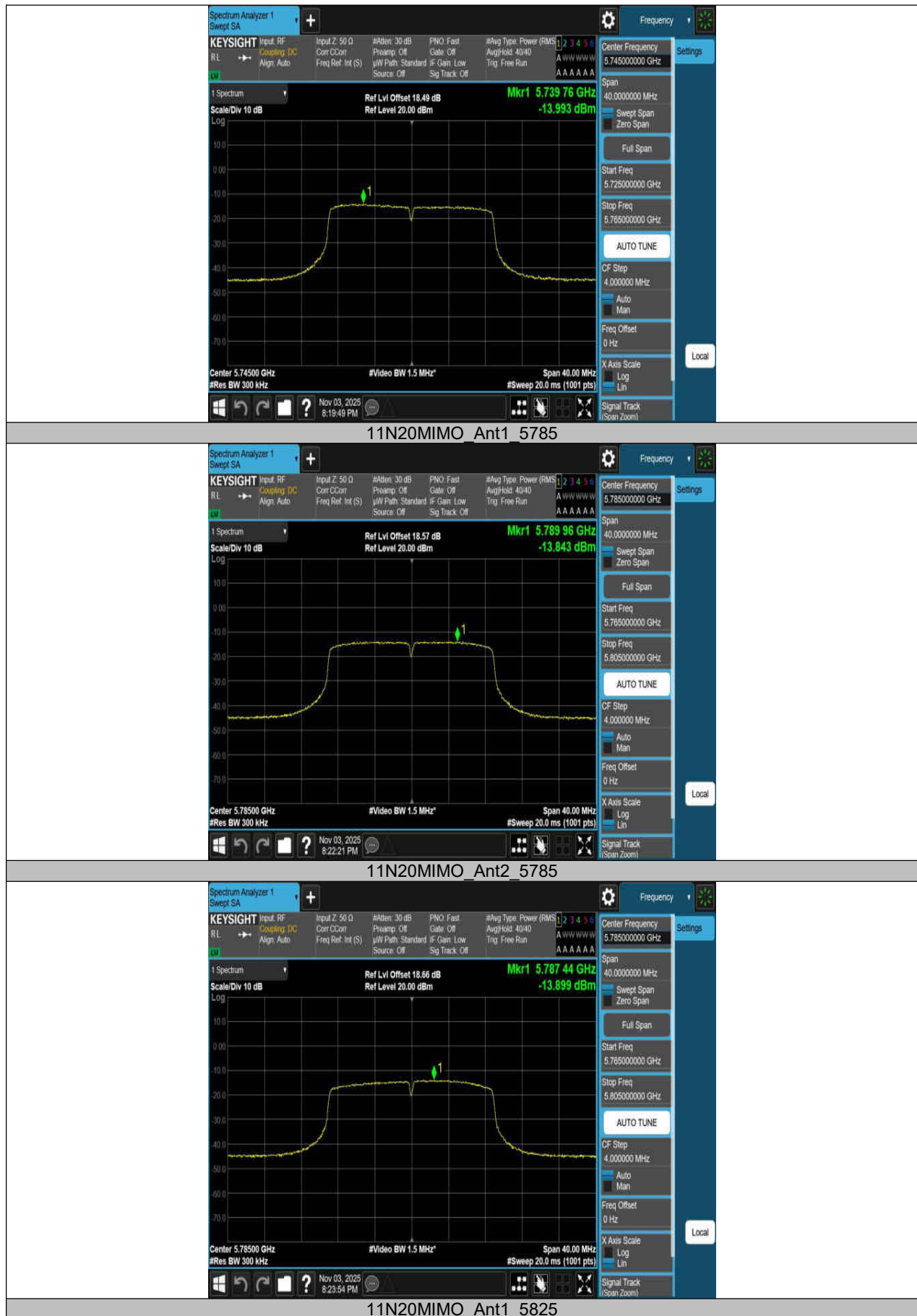






















12. Frequency Stability Measurement

12.1. Block Diagram of Test Setup

Same as section 8.1

12.2. 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.

12.3. 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 10 dB 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.

12.4. Test Result

Voltage								
Test Mode	Ant.	Freq. (MHz)	Voltage (Vdc)	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
11N20MI MO	Ant1	5180	NV	NT	-43000.00	-8.301158	20	PASS
			LV	NT	-42000.00	-8.108108	20	PASS
			HV	NT	-43000.00	-8.301158	20	PASS
		5200	NV	NT	-41000.00	-7.884615	20	PASS
			LV	NT	-40000.00	-7.692308	20	PASS
			HV	NT	-41000.00	-7.884615	20	PASS
		5240	NV	NT	-40000.00	-7.633588	20	PASS
			LV	NT	-40000.00	-7.633588	20	PASS
			HV	NT	-40000.00	-7.633588	20	PASS
		5260	NV	NT	-41000.00	-7.794677	20	PASS
			LV	NT	-40000.00	-7.604563	20	PASS
			HV	NT	-41000.00	-7.794677	20	PASS
		5280	NV	NT	-39000.00	-7.386364	20	PASS
			LV	NT	-39000.00	-7.386364	20	PASS
			HV	NT	-40000.00	-7.575758	20	PASS
		5320	NV	NT	-40000.00	-7.518797	20	PASS
			LV	NT	-39000.00	-7.330827	20	PASS
			HV	NT	-40000.00	-7.518797	20	PASS
		5500	NV	NT	-40000.00	-7.272727	20	PASS
			LV	NT	-40000.00	-7.272727	20	PASS
			HV	NT	-41000.00	-7.454545	20	PASS
		5580	NV	NT	-42000.00	-7.526882	20	PASS
			LV	NT	-41000.00	-7.347670	20	PASS
			HV	NT	-42000.00	-7.526882	20	PASS
		5700	NV	NT	-42000.00	-7.368421	20	PASS
			LV	NT	-41000.00	-7.192982	20	PASS
			HV	NT	-42000.00	-7.368421	20	PASS
		5720	NV	NT	-42000.00	-7.342657	20	PASS
			LV	NT	-42000.00	-7.342657	20	PASS
			HV	NT	-42000.00	-7.342657	20	PASS
		5745	NV	NT	-28000.00	-4.873803	20	PASS
			LV	NT	-28000.00	-4.873803	20	PASS
			HV	NT	-28000.00	-4.873803	20	PASS
		5785	NV	NT	-32000.00	-5.531547	20	PASS
			LV	NT	-29000.00	-5.012965	20	PASS

		5825	HV	NT	-34000.00	-5.877269	20	PASS
			NV	NT	-41000.00	-7.038627	20	PASS
			LV	NT	-40000.00	-6.866953	20	PASS
			HV	NT	-41000.00	-7.038627	20	PASS
11N40MI MO	Ant1	5190	NV	NT	-34000.00	-6.551060	20	PASS
			LV	NT	-34000.00	-6.551060	20	PASS
			HV	NT	-34000.00	-6.551060	20	PASS
		5230	NV	NT	-36000.00	-6.883365	20	PASS
			LV	NT	-36000.00	-6.883365	20	PASS
			HV	NT	-36000.00	-6.883365	20	PASS
		5270	NV	NT	-37000.00	-7.020873	20	PASS
			LV	NT	-37000.00	-7.020873	20	PASS
			HV	NT	-37000.00	-7.020873	20	PASS
		5310	NV	NT	-38000.00	-7.156309	20	PASS
			LV	NT	-38000.00	-7.156309	20	PASS
			HV	NT	-37000.00	-6.967985	20	PASS
		5510	NV	NT	-36000.00	-6.533575	20	PASS
			LV	NT	-36000.00	-6.533575	20	PASS
			HV	NT	-36000.00	-6.533575	20	PASS
		5550	NV	NT	-38000.00	-6.846847	20	PASS
			LV	NT	-39000.00	-7.027027	20	PASS
			HV	NT	-38000.00	-6.846847	20	PASS
		5670	NV	NT	-40000.00	-7.054674	20	PASS
			LV	NT	-41000.00	-7.231041	20	PASS
			HV	NT	-40000.00	-7.054674	20	PASS
		5710	NV	NT	-41000.00	-7.180385	20	PASS
			LV	NT	-41000.00	-7.180385	20	PASS
			HV	NT	-41000.00	-7.180385	20	PASS
		5755	NV	NT	-41000.00	-7.124240	20	PASS
			LV	NT	-41000.00	-7.124240	20	PASS
			HV	NT	-40000.00	-6.950478	20	PASS
		5795	NV	NT	-42000.00	-7.247627	20	PASS
			LV	NT	-42000.00	-7.247627	20	PASS
			HV	NT	-42000.00	-7.247627	20	PASS

Temperature								
Test Mode	Antenna	Frequency (MHz)	Voltage (Vdc)	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
11N20MIMO	Ant1	5180	NV	-20	-43000.00	-8.301158	20	PASS
			NV	-10	-44000.00	-8.494208	20	PASS
			NV	0	-44000.00	-8.494208	20	PASS
			NV	10	-43000.00	-8.301158	20	PASS
			NV	20	-43000.00	-8.301158	20	PASS
			NV	30	-43000.00	-8.301158	20	PASS
			NV	40	-43000.00	-8.301158	20	PASS
			NV	50	-43000.00	-8.301158	20	PASS
		5200	NV	-20	-42000.00	-8.076923	20	PASS
			NV	-10	-42000.00	-8.076923	20	PASS
			NV	0	-43000.00	-8.269231	20	PASS
			NV	10	-43000.00	-8.269231	20	PASS
			NV	20	-43000.00	-8.269231	20	PASS
			NV	30	-43000.00	-8.269231	20	PASS
			NV	40	-43000.00	-8.269231	20	PASS
			NV	50	-43000.00	-8.269231	20	PASS
		5240	NV	-20	-41000.00	-7.824427	20	PASS
			NV	-10	-40000.00	-7.633588	20	PASS
			NV	0	-40000.00	-7.633588	20	PASS
			NV	10	-40000.00	-7.633588	20	PASS
			NV	20	-40000.00	-7.633588	20	PASS
			NV	30	-40000.00	-7.633588	20	PASS
			NV	40	-40000.00	-7.633588	20	PASS
			NV	50	-40000.00	-7.633588	20	PASS
		5260	NV	-20	-41000.00	-7.794677	20	PASS
			NV	-10	-41000.00	-7.794677	20	PASS
			NV	0	-41000.00	-7.794677	20	PASS
			NV	10	-41000.00	-7.794677	20	PASS

			NV	20	-41000.00	-7.794677	20	PASS
			NV	30	-40000.00	-7.604563	20	PASS
			NV	40	-40000.00	-7.604563	20	PASS
			NV	50	-40000.00	-7.604563	20	PASS
		5280	NV	-20	-40000.00	-7.575758	20	PASS
			NV	-10	-39000.00	-7.386364	20	PASS
			NV	0	-40000.00	-7.575758	20	PASS
			NV	10	-39000.00	-7.386364	20	PASS
			NV	20	-39000.00	-7.386364	20	PASS
			NV	30	-39000.00	-7.386364	20	PASS
			NV	40	-38000.00	-7.196970	20	PASS
			NV	50	-38000.00	-7.196970	20	PASS
		5320	NV	-20	-40000.00	-7.518797	20	PASS
			NV	-10	-40000.00	-7.518797	20	PASS
			NV	0	-40000.00	-7.518797	20	PASS
			NV	10	-40000.00	-7.518797	20	PASS
			NV	20	-40000.00	-7.518797	20	PASS
			NV	30	-40000.00	-7.518797	20	PASS
			NV	40	-40000.00	-7.518797	20	PASS
			NV	50	-39000.00	-7.330827	20	PASS
		5500	NV	-20	-40000.00	-7.272727	20	PASS
			NV	-10	-40000.00	-7.272727	20	PASS
			NV	0	-40000.00	-7.272727	20	PASS
			NV	10	-39000.00	-7.090909	20	PASS
			NV	20	-39000.00	-7.090909	20	PASS
			NV	30	-38000.00	-6.909091	20	PASS
			NV	40	-37000.00	-6.727273	20	PASS
			NV	50	-37000.00	-6.727273	20	PASS
		5580	NV	-20	-42000.00	-7.526882	20	PASS
			NV	-10	-42000.00	-7.526882	20	PASS
			NV	0	-42000.00	-7.526882	20	PASS
			NV	10	-42000.00	-7.526882	20	PASS
			NV	20	-41000.00	-7.347670	20	PASS
			NV	30	-41000.00	-7.347670	20	PASS
			NV	40	-40000.00	-7.168459	20	PASS
			NV	50	-39000.00	-6.989247	20	PASS
		5700	NV	-20	-42000.00	-7.368421	20	PASS
			NV	-10	-42000.00	-7.368421	20	PASS
			NV	0	-42000.00	-7.368421	20	PASS
			NV	10	-42000.00	-7.368421	20	PASS
			NV	20	-41000.00	-7.192982	20	PASS
			NV	30	-41000.00	-7.192982	20	PASS
			NV	40	-41000.00	-7.192982	20	PASS
			NV	50	-40000.00	-7.017544	20	PASS
		5720	NV	-20	-42000.00	-7.342657	20	PASS
			NV	-10	-42000.00	-7.342657	20	PASS
			NV	0	-41000.00	-7.167832	20	PASS
			NV	10	-41000.00	-7.167832	20	PASS
			NV	20	-40000.00	-6.993007	20	PASS
			NV	30	-40000.00	-6.993007	20	PASS
			NV	40	-39000.00	-6.818182	20	PASS
			NV	50	-39000.00	-6.818182	20	PASS
		5745	NV	-20	-27000.00	-4.699739	20	PASS
			NV	-10	-27000.00	-4.699739	20	PASS
			NV	0	-27000.00	-4.699739	20	PASS
			NV	10	-27000.00	-4.699739	20	PASS
			NV	20	-27000.00	-4.699739	20	PASS
			NV	30	-26000.00	-4.525674	20	PASS
			NV	40	-26000.00	-4.525674	20	PASS
			NV	50	-26000.00	-4.525674	20	PASS
		5785	NV	-20	-37000.00	-6.395851	20	PASS
			NV	-10	-39000.00	-6.741573	20	PASS
			NV	0	-41000.00	-7.087295	20	PASS
			NV	10	-43000.00	-7.433016	20	PASS
			NV	20	-44000.00	-7.605877	20	PASS
			NV	30	-45000.00	-7.778738	20	PASS
			NV	40	-46000.00	-7.951599	20	PASS

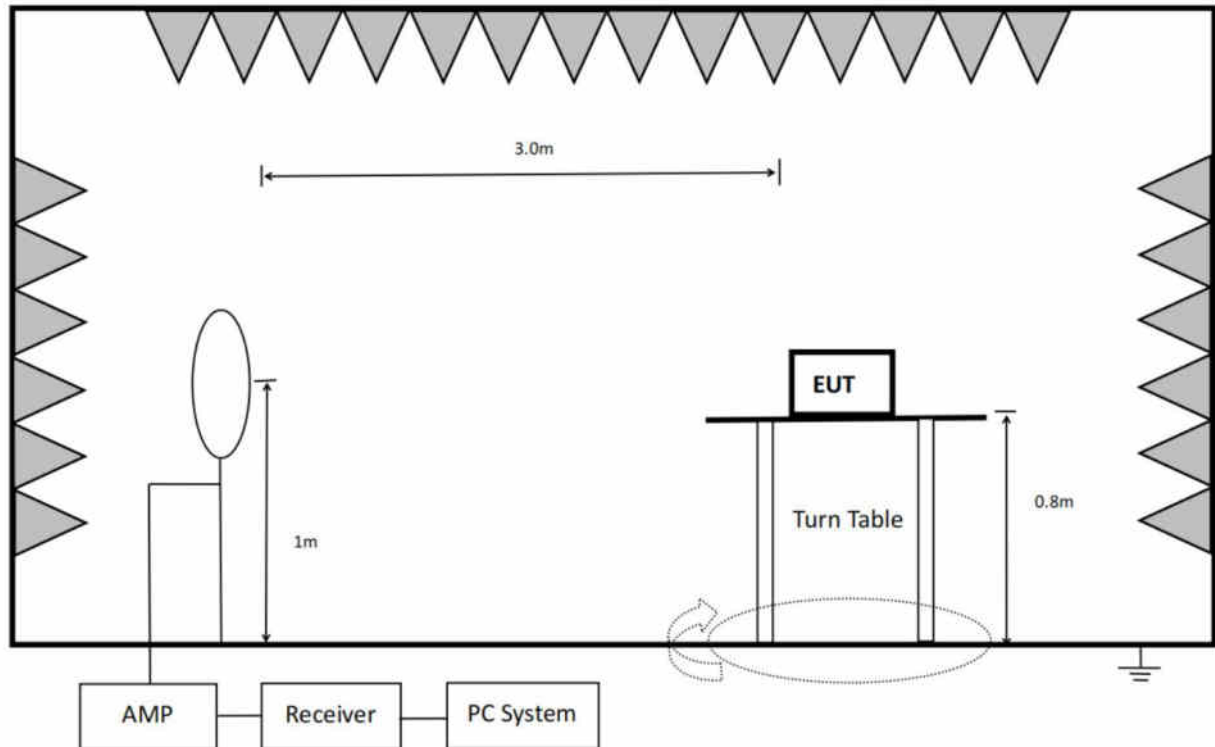
		5825	NV	50	-46000.00	-7.951599	20	PASS
			NV	-20	-41000.00	-7.038627	20	PASS
			NV	-10	-41000.00	-7.038627	20	PASS
			NV	0	-41000.00	-7.038627	20	PASS
			NV	10	-40000.00	-6.866953	20	PASS
			NV	20	-40000.00	-6.866953	20	PASS
			NV	30	-40000.00	-6.866953	20	PASS
			NV	40	-39000.00	-6.695279	20	PASS
			NV	50	-39000.00	-6.695279	20	PASS
11N40MIMO	Ant1	5190	NV	-20	-34000.00	-6.551060	20	PASS
			NV	-10	-35000.00	-6.743738	20	PASS
			NV	0	-35000.00	-6.743738	20	PASS
			NV	10	-35000.00	-6.743738	20	PASS
			NV	20	-35000.00	-6.743738	20	PASS
			NV	30	-35000.00	-6.743738	20	PASS
			NV	40	-35000.00	-6.743738	20	PASS
			NV	50	-36000.00	-6.936416	20	PASS
		5230	NV	-20	-36000.00	-6.883365	20	PASS
			NV	-10	-36000.00	-6.883365	20	PASS
			NV	0	-36000.00	-6.883365	20	PASS
			NV	10	-36000.00	-6.883365	20	PASS
			NV	20	-36000.00	-6.883365	20	PASS
			NV	30	-36000.00	-6.883365	20	PASS
			NV	40	-36000.00	-6.883365	20	PASS
			NV	50	-37000.00	-7.074570	20	PASS
		5270	NV	-20	-37000.00	-7.020873	20	PASS
			NV	-10	-37000.00	-7.020873	20	PASS
			NV	0	-37000.00	-7.020873	20	PASS
			NV	10	-37000.00	-7.020873	20	PASS
			NV	20	-37000.00	-7.020873	20	PASS
			NV	30	-37000.00	-7.020873	20	PASS
			NV	40	-37000.00	-7.020873	20	PASS
			NV	50	-37000.00	-7.020873	20	PASS
		5310	NV	-20	-37000.00	-6.967985	20	PASS
			NV	-10	-37000.00	-6.967985	20	PASS
			NV	0	-37000.00	-6.967985	20	PASS
			NV	10	-37000.00	-6.967985	20	PASS
			NV	20	-37000.00	-6.967985	20	PASS
			NV	30	-37000.00	-6.967985	20	PASS
			NV	40	-37000.00	-6.967985	20	PASS
			NV	50	-38000.00	-7.156309	20	PASS
		5510	NV	-20	-36000.00	-6.533575	20	PASS
			NV	-10	-36000.00	-6.533575	20	PASS
			NV	0	-36000.00	-6.533575	20	PASS
			NV	10	-36000.00	-6.533575	20	PASS
			NV	20	-37000.00	-6.715064	20	PASS
			NV	30	-37000.00	-6.715064	20	PASS
			NV	40	-37000.00	-6.715064	20	PASS
			NV	50	-37000.00	-6.715064	20	PASS
		5550	NV	-20	-38000.00	-6.846847	20	PASS
			NV	-10	-38000.00	-6.846847	20	PASS
			NV	0	-38000.00	-6.846847	20	PASS
			NV	10	-38000.00	-6.846847	20	PASS
			NV	20	-39000.00	-7.027027	20	PASS
			NV	30	-39000.00	-7.027027	20	PASS
			NV	40	-39000.00	-7.027027	20	PASS
			NV	50	-39000.00	-7.027027	20	PASS
		5670	NV	-20	-40000.00	-7.054674	20	PASS
			NV	-10	-40000.00	-7.054674	20	PASS
			NV	0	-40000.00	-7.054674	20	PASS
			NV	10	-40000.00	-7.054674	20	PASS
			NV	20	-41000.00	-7.231041	20	PASS
			NV	30	-41000.00	-7.231041	20	PASS
			NV	40	-41000.00	-7.231041	20	PASS
			NV	50	-41000.00	-7.231041	20	PASS
		5710	NV	-20	-41000.00	-7.180385	20	PASS
			NV	-10	-41000.00	-7.180385	20	PASS

			NV	0	-41000.00	-7.180385	20	PASS
			NV	10	-41000.00	-7.180385	20	PASS
			NV	20	-41000.00	-7.180385	20	PASS
			NV	30	-41000.00	-7.180385	20	PASS
			NV	40	-41000.00	-7.180385	20	PASS
			NV	50	-41000.00	-7.180385	20	PASS
		5755	NV	-20	-40000.00	-6.950478	20	PASS
			NV	-10	-40000.00	-6.950478	20	PASS
			NV	0	-40000.00	-6.950478	20	PASS
			NV	10	-41000.00	-7.124240	20	PASS
			NV	20	-41000.00	-7.124240	20	PASS
			NV	30	-41000.00	-7.124240	20	PASS
		5795	NV	40	-41000.00	-7.124240	20	PASS
			NV	50	-41000.00	-7.124240	20	PASS
			NV	-20	-42000.00	-7.247627	20	PASS
			NV	-10	-42000.00	-7.247627	20	PASS
			NV	0	-42000.00	-7.247627	20	PASS
			NV	10	-43000.00	-7.420190	20	PASS
			NV	20	-43000.00	-7.420190	20	PASS
			NV	30	-43000.00	-7.420190	20	PASS
			NV	40	-43000.00	-7.420190	20	PASS
			NV	50	-43000.00	-7.420190	20	PASS

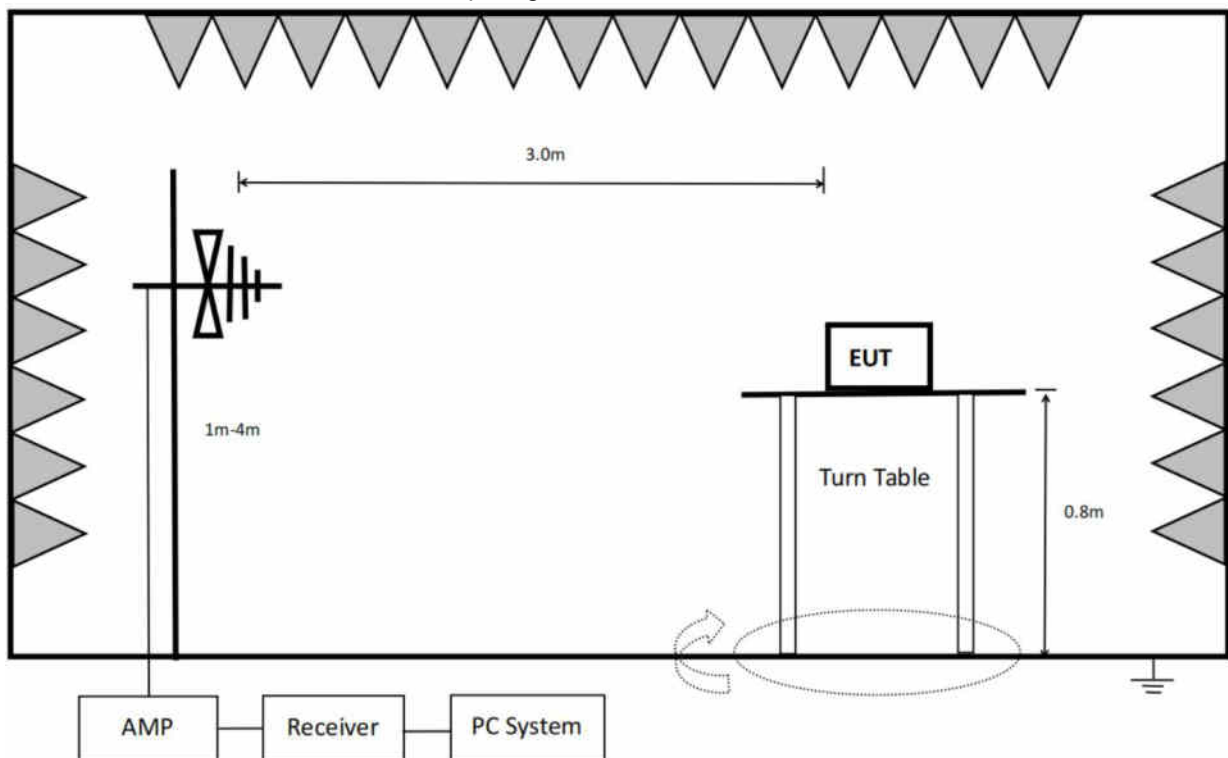
13. Radiated Emission

13.1. Block Diagram of Test Setup

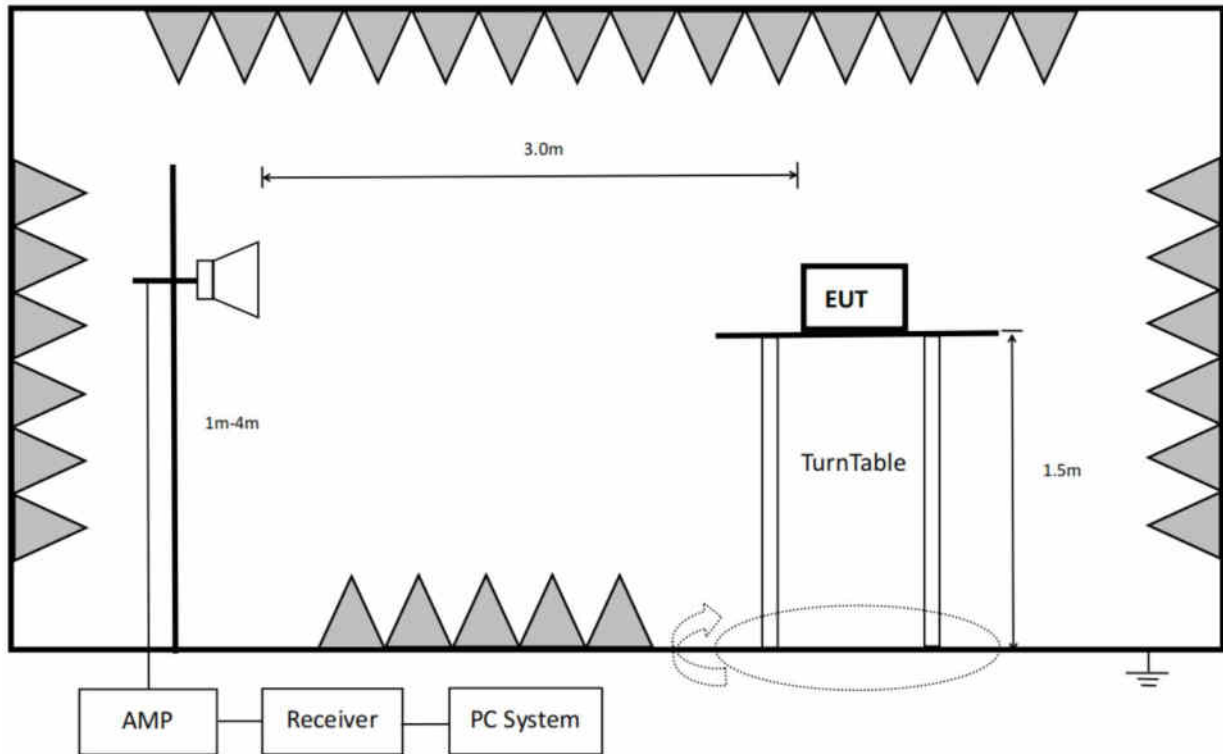
In 3 m Anechoic Chamber, test setup diagram for 9 kHz - 30 MHz:



In 3 m Anechoic Chamber, test setup diagram for 30 MHz - 1 GHz:



In 3 m Anechoic Chamber, test setup diagram for frequency above 1 GHz:



Note: For harmonic emissions test an appropriate high pass filter was inserted in the input port of AMP.

13.2. Limit

- (1) FCC 15.205 Restricted frequency band.
- (2) RSS-Gen section 8.10 Restricted frequency band.

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.1772&4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.2072&4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

¹Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

²Above 38.6

(3) FCC 15.209 Limit.

(4) RSS-Gen section 8.9 Limit.

Frequency MHz	Distance Meters	Field strengths limit	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
0.009 ~ 0.490	300	$2400/\text{F}(\text{kHz})$	$67.6-20\log(\text{F})$
0.490 ~ 1.705	30	$24000/\text{F}(\text{kHz})$	$87.6-20\log(\text{F})$
1.705 ~ 30.0	30	30	29.54
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of $-27 \text{ dBm} / \text{MHz}$.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of $-27 \text{ dBm} / \text{MHz}$.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of $-27 \text{ dBm} / \text{MHz}$.

(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz ; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of $-27 \text{ dBm} / \text{MHz}$.

(5) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

(6) The provisions of §15.205 apply to intentional radiators operating under this section.

$-27 \text{ dBm/MHz Limit} = 95.2 + \text{EIRP (dBm)} = 95.2 - 27 = 68.2 \text{ dB}\mu\text{V/m}$

Note:

(1) The emission limits shown in the above table are based on measurements employing a CISPR QP detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

(2) At frequencies below 30MHz, measurement may be performed at a distance closer than that specified, and the limit at closer measurement distance can be extrapolated by below formula:

$$\text{Limit}_{3\text{m}}(\text{dB}\mu\text{V/m}) = \text{Limit}_{30\text{m}}(\text{dB}\mu\text{V/m}) + 40\log(30\text{m}/3\text{m})$$

(3) Limit for this EUT

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions or comply with 15.209 limits.

13.3. Test Procedure

Below 30 MHz:

The setting of the spectrum Analyzer

RBW	200 Hz (From 9 kHz to 0.15 MHz)/ 9 kHz (From 0.15 MHz to 30 MHz)
VBW	200 Hz (From 9 kHz to 0.15 MHz)/ 9 kHz (From 0.15 MHz to 30 MHz)
Sweep	Auto
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2020/Cor1-2023

2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both Horizontal, Face-on and Face-off polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80 cm meter above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of 1 meter height antenna tower.

5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

6. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

7. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30m open field site. Therefore, sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field site based on KdB 414788.

Below 1 GHz and above 30 MHz:

The setting of the spectrum Analyzer

RBW	120 kHz
VBW	300 kHz
Sweep	Auto
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2020/Cor1-2023.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80 cm above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

Above 1 GHz:

RBW	1 MHz
VBW	PEAK: 3 MHz AVG: see note 6
Sweep	Auto
Detector	Peak
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2020/Cor1-2023.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 1.5m above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement above 1GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.

6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video

bandwidth with peak detector for AVG measurements. For the Duty Cycle please refer to clause 8.1.ON TIME AND DUTY CYCLE.

7. Restriction band: Investigated frequency range from 5.15-5.25 GHz, 5250-5350 GHz, 5470-5725 GHz, 5.725-5.85 GHz.

All restriction band should comply with 15.209, other emission should be at least 20 dB below the fundamental.

Note 1: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

Note 2: The EUT does not support simultaneous transmission.

Note 3: The EUT was fully exercised with external accessories during the test. In the case of multiple accessory external ports, an external accessory shall be connected to one of each type of port.

13.4. Test Result

PASS. (See below detailed test result)

All the emissions except fundamental emission from 9kHz to 40GHz were comply with 15.209 limit.

Note1: According exploratory test, the emission levels are 20 dB below the limit detected from 9 kHz to 30 MHz and 18 GHz to 40 GHz, so the final test was performed with frequency range from 30 MHz to 18 GHz and recorded in below.

Note2: For emissions below 1 GHz, according exploratory explorer test, when change Tx mode and channel, have no distinct influence on emissions level, so for emissions below 1 GHz, the final test was only performed with EUT working in 11a mode.

Note3: For below test data, when the limit tabular marked “/” means this frequency point is the fundamental emission and no need comply with this limit.

Note 4: As specified in 15.407(b), emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz (or -17 dBm/MHz as specified in 15.407(b)(4)). However, an out-of-band emission that complies with both the average and peak limits of 15.209 is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz peak emission limit

Note 5: For emissions Above 1 GHz, all mode have been tested, 11a mode of ANT1 is worse case and recorded in report.

Band edge measurements

5250-5350MHz

Test Mode	Ant.	Freq. (MHz)	Ref Level(dBm)	Result(dBm)	Limit (dBm)	Verdict
11A	Ant1	5240	-3.57	-46.85	-29.57	PASS
11A	Ant2	5240	-3.07	-42.08	-29.07	PASS
11N20MIMO	Ant1	5240	-3.47	-47.24	-29.47	PASS
11N20MIMO	Ant2	5240	-3.49	-42.66	-29.49	PASS
11N40MIMO	Ant1	5230	-4.29	-44.61	-30.29	PASS
11N40MIMO	Ant2	5230	-5.01	-42.41	-31.01	PASS

13.5. Original Test Data

Below 1 GHz and above 30 MHz test data Refer to appendix A

Above 1 GHz test data Refer to appendix B

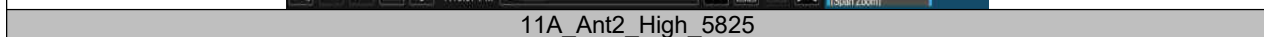
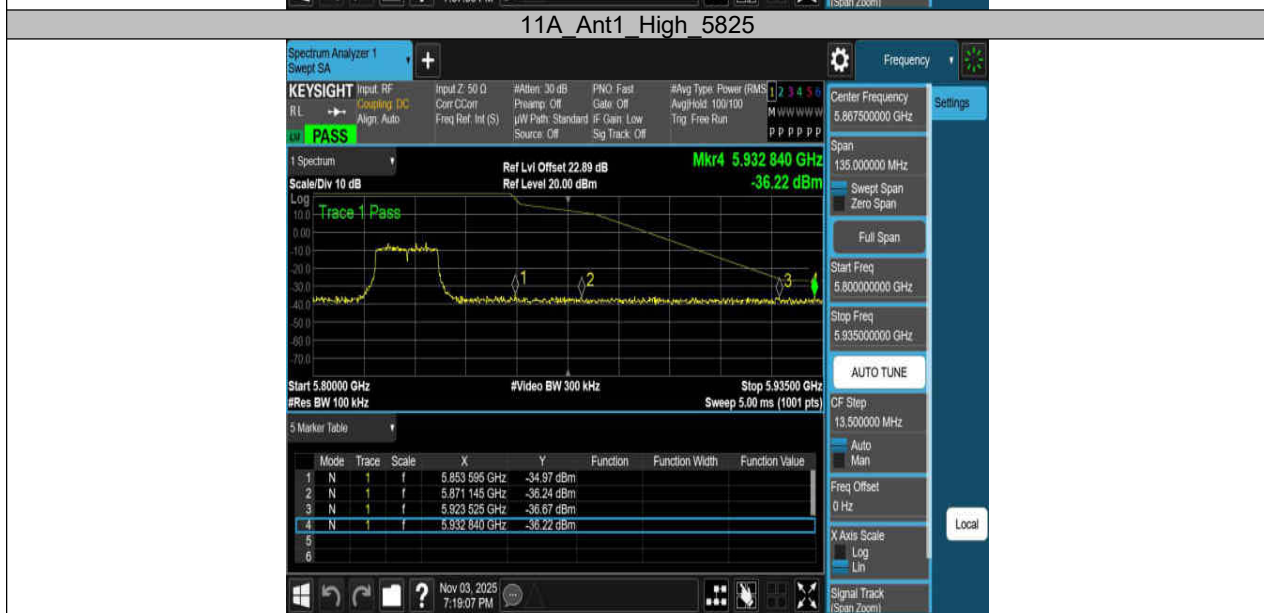
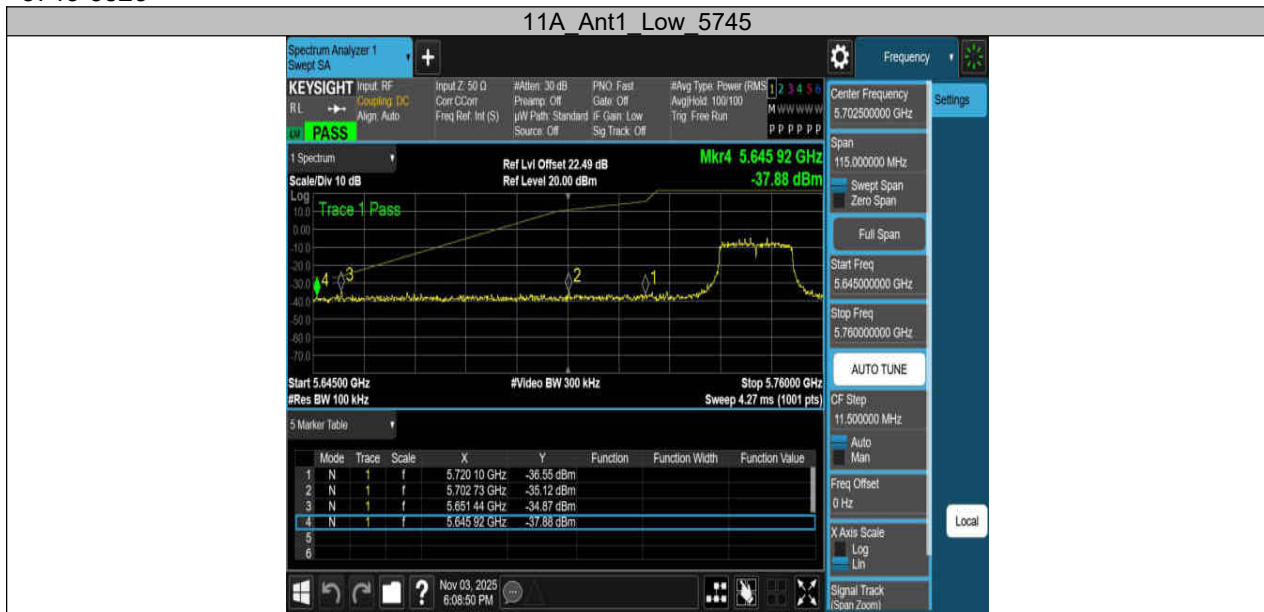
Note: Offset=cable loss+antenna gain

5250-5350MHz





5745-5825



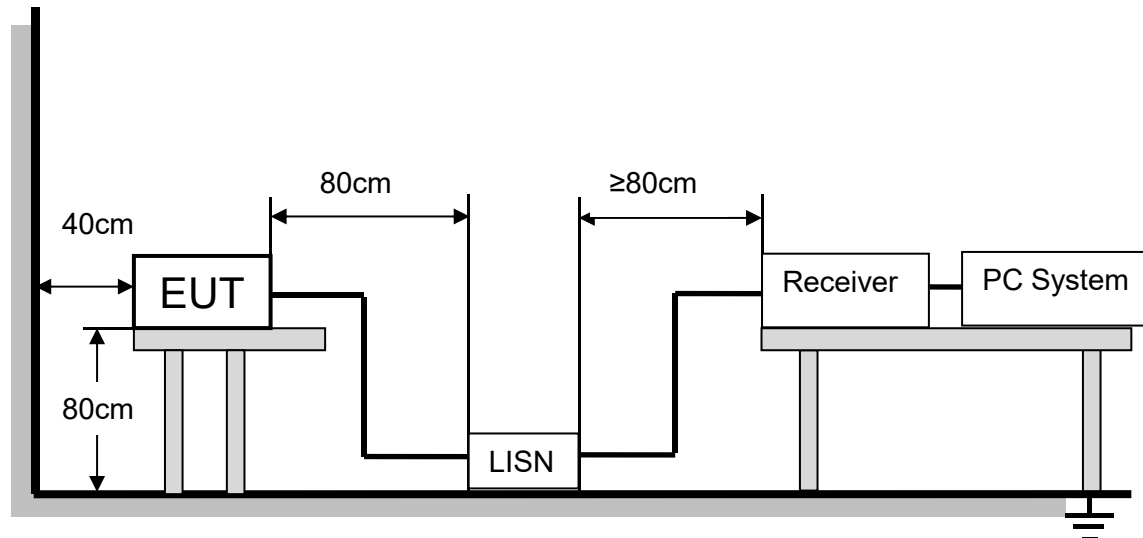






14. AC Power Line Conducted Emissions

14.1. Block Diagram of Test Setup



The EUT is put on a table of non-conducting material that is 80 cm high. The vertical conducting wall of shielding is located 40 cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through an Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 6.2 of ANSI C63.10-2020/Cor1-2023. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9 kHz.

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

14.2. Limits

Please refer to CFR 47 FCC §15.207 (a) and ISED RSS-Gen Clause 8.8.

Frequency (MHz)	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

Note 1: * Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

14.3. Test Procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 10.2 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.

All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30 MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in clause 2.4 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level.

The EUT configuration and worse cable configuration of the above highest emission levels were recorded for reference of the final test.

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions.

Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 9 kHz.

14.4. Test Result

Pass. (See below detailed test result)

Note1: All emissions not reported below are too low against the prescribed limits.

Note2: Pre-test AC conducted emission at both voltage AC 120V/60Hz and AC 240V/50Hz, recorded worse case.

Note3: $\text{Measurement} = \text{Reading Level} + \text{Correct Factor}$

$\text{Over} = \text{Measurement} - \text{Limit}$

14.5. Original Test Data

AC Power Line Conducted Emission Test Data Refer to appendix C

15. Dynamic Frequency Selection

15.1. Applicability of DFS Requirements

A U-NII network will employ a DFS function to detect signals from radar systems and to avoid co-channel operation with these systems. This applies to the 5250-5350 MHz and/or 5470-5725 MHz bands.

Within the context of the operation of the DFS function, a U-NII device will operate in either Master Mode or Client Mode. U-NII devices operating in Client Mode can only operate in a network controlled by a U-NII device operating in Master Mode.

Table 1: Applicability of DFS Requirements Prior to Use of a Channel

Requirement	Operational Mode		
	☐ Master	☒ Client Without Radar Detection	☐ Client with Radar Detection
Non-Occupancy Period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode	
	☐ Master Device or Client with Radar Detection	☒ Client Without Radar Detection
DFS Detection Threshold	Yes	Not required
Channel Closing Transmission Time	Yes	Yes
Channel Move Time	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required

Additional requirements for devices with multiple bandwidth modes	☐ Master Device or Client with Radar Detection	☒ Client Without Radar Detection
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not required

Note: Frequencies selected for statistical performance check should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.

15.2. Limit

(1) DFS Detection Thresholds

Table 3: DFS Detection Thresholds for Master Devices and Client Devices with Radar Detection

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP $\geq$ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna.

Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the

test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.

Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KdB Publication 662911 D01.

(2) DFS Response Requirements

Table 4: DFS Response Requirement Values

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.

Note 1: Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.

Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required facilitating a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

Note 3: During the U-NII Detection Bandwidth detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

15.3. Parameters of Radar Test Waveform

This section provides the parameters for required test waveforms, minimum percentage of successful detection, and the minimum number of trials that must be used for determining DFS conformance. Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms.

Table 5 Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A	Roundup $\left\{ \frac{1}{\left(\frac{360}{\text{PRI}_{\mu\text{sec}}} \right)} \right\}$	60%	30
		Test B			
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120
Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests. Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a Test B: 15 unique PRI values randomly selected within the range of 518-3066 μsec, with a minimum increment of 1 μsec, excluding PRI values selected in Test A					

A minimum of 30 unique waveforms are required for each of the Short Pulse Radar Types 2 through 4. If more than 30 waveforms are used for Short Pulse Radar Types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. If more than 30 waveforms are used for Short Pulse Radar Type 1, then each additional waveform is generated with