





## 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
11AX20S ISO	Ant1	5180	NV	NT	-43000.00	-8.301158	20	PASS
			LV	NT	-44000.00	-8.494208	20	PASS
			HV	NT	-44000.00	-8.494208	20	PASS
		5200	NV	NT	-37000.00	-7.115385	20	PASS
			LV	NT	-36000.00	-6.923077	20	PASS
			HV	NT	-36000.00	-6.923077	20	PASS
		5240	NV	NT	-39000.00	-7.442748	20	PASS
			LV	NT	-40000.00	-7.633588	20	PASS
			HV	NT	-40000.00	-7.633588	20	PASS
		5260	NV	NT	-50000.00	-9.505703	20	PASS
			LV	NT	-49000.00	-9.315589	20	PASS
			HV	NT	-49000.00	-9.315589	20	PASS
		5280	NV	NT	-41000.00	-7.765152	20	PASS
			LV	NT	-40000.00	-7.575758	20	PASS
			HV	NT	-40000.00	-7.575758	20	PASS
		5320	NV	NT	-41000.00	-7.706767	20	PASS
			LV	NT	-42000.00	-7.894737	20	PASS
			HV	NT	-41000.00	-7.706767	20	PASS
		5500	NV	NT	-43000.00	-7.818182	20	PASS
			LV	NT	-43000.00	-7.818182	20	PASS
			HV	NT	-43000.00	-7.818182	20	PASS
		5580	NV	NT	-44000.00	-7.885305	20	PASS
			LV	NT	-44000.00	-7.885305	20	PASS
			HV	NT	-44000.00	-7.885305	20	PASS
		5700	NV	NT	-45000.00	-7.894737	20	PASS
			LV	NT	-45000.00	-7.894737	20	PASS
			HV	NT	-46000.00	-8.070175	20	PASS
		5720	NV	NT	-45000.00	-7.867133	20	PASS
			LV	NT	-45000.00	-7.867133	20	PASS
			HV	NT	-46000.00	-8.041958	20	PASS
		5745	NV	NT	-46000.00	-8.006963	20	PASS
			LV	NT	-46000.00	-8.006963	20	PASS

		5785	HV	NT	-46000.00	-8.006963	20	PASS
			NV	NT	-46000.00	-7.951599	20	PASS
			LV	NT	-46000.00	-7.951599	20	PASS
		5825	HV	NT	-45000.00	-7.778738	20	PASS
			NV	NT	-46000.00	-7.896996	20	PASS
			LV	NT	-46000.00	-7.896996	20	PASS
			HV	NT	-46000.00	-7.896996	20	PASS
			NV	NT	-41000.00	-7.899807	20	PASS
			LV	NT	-41000.00	-7.899807	20	PASS
11AX40S ISO	Ant1	5190	HV	NT	-41000.00	-7.899807	20	PASS
			NV	NT	-42000.00	-8.030593	20	PASS
			LV	NT	-42000.00	-8.030593	20	PASS
		5230	HV	NT	-43000.00	-8.221797	20	PASS
			NV	NT	-43000.00	-8.159393	20	PASS
			LV	NT	-43000.00	-8.159393	20	PASS
		5270	HV	NT	-42000.00	-7.969639	20	PASS
			NV	NT	-43000.00	-8.097928	20	PASS
			LV	NT	-44000.00	-8.286252	20	PASS
		5310	HV	NT	-44000.00	-8.286252	20	PASS
			NV	NT	-45000.00	-8.166969	20	PASS
			LV	NT	-44000.00	-7.985481	20	PASS
		5510	HV	NT	-45000.00	-8.166969	20	PASS
			NV	NT	-43000.00	-7.747748	20	PASS
			LV	NT	-49000.00	-8.828829	20	PASS
		5550	HV	NT	-48000.00	-8.648649	20	PASS
			NV	NT	-46000.00	-8.112875	20	PASS
			LV	NT	-46000.00	-8.112875	20	PASS
		5670	HV	NT	-46000.00	-8.112875	20	PASS
			NV	NT	-45000.00	-7.880911	20	PASS
			LV	NT	-46000.00	-8.056042	20	PASS
		5710	HV	NT	-46000.00	-8.056042	20	PASS
			NV	NT	-46000.00	-7.993050	20	PASS
			LV	NT	-46000.00	-7.993050	20	PASS
		5755	HV	NT	-46000.00	-7.993050	20	PASS
			NV	NT	-47000.00	-8.110440	20	PASS
			LV	NT	-47000.00	-8.110440	20	PASS
		5795	HV	NT	-47000.00	-8.110440	20	PASS
			NV	NT	-47000.00	-8.110440	20	PASS
			LV	NT	-47000.00	-8.110440	20	PASS

Temperature								
Test Mode	Antenna	Frequency (MHz)	Voltage (Vdc)	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
11AX20SISO	Ant1	5180	NV	-30	-44000.00	-8.494208	20	PASS
			NV	-20	-43000.00	-8.301158	20	PASS
			NV	-10	-43000.00	-8.301158	20	PASS
			NV	0	-43000.00	-8.301158	20	PASS
			NV	10	-43000.00	-8.301158	20	PASS
			NV	20	-43000.00	-8.301158	20	PASS
			NV	30	-44000.00	-8.494208	20	PASS
			NV	40	-43000.00	-8.301158	20	PASS
		5200	NV	50	-44000.00	-8.494208	20	PASS
			NV	-30	-37000.00	-7.115385	20	PASS
			NV	-20	-37000.00	-7.115385	20	PASS
			NV	-10	-37000.00	-7.115385	20	PASS
			NV	0	-38000.00	-7.307692	20	PASS
			NV	10	-38000.00	-7.307692	20	PASS
			NV	20	-38000.00	-7.307692	20	PASS
			NV	30	-38000.00	-7.307692	20	PASS
			NV	40	-38000.00	-7.307692	20	PASS
			NV	50	-38000.00	-7.307692	20	PASS

		5240	NV	-30	-41000.00	-7.824427	20	PASS
			NV	-20	-40000.00	-7.633588	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	-41000.00	-7.824427	20	PASS
			NV	30	-41000.00	-7.824427	20	PASS
			NV	40	-40000.00	-7.633588	20	PASS
		5260	NV	50	-41000.00	-7.824427	20	PASS
			NV	-30	-49000.00	-9.315589	20	PASS
			NV	-20	-49000.00	-9.315589	20	PASS
			NV	-10	-49000.00	-9.315589	20	PASS
			NV	0	-49000.00	-9.315589	20	PASS
			NV	10	-49000.00	-9.315589	20	PASS
			NV	20	-50000.00	-9.505703	20	PASS
			NV	30	-50000.00	-9.505703	20	PASS
		5280	NV	40	-50000.00	-9.505703	20	PASS
			NV	50	-51000.00	-9.695817	20	PASS
			NV	-30	-40000.00	-7.575758	20	PASS
			NV	-20	-41000.00	-7.765152	20	PASS
			NV	-10	-41000.00	-7.765152	20	PASS
			NV	0	-41000.00	-7.765152	20	PASS
			NV	10	-41000.00	-7.765152	20	PASS
			NV	20	-41000.00	-7.765152	20	PASS
		5320	NV	30	-41000.00	-7.765152	20	PASS
			NV	40	-41000.00	-7.765152	20	PASS
			NV	50	-41000.00	-7.765152	20	PASS
			NV	-30	-41000.00	-7.706767	20	PASS
			NV	-20	-41000.00	-7.706767	20	PASS
			NV	-10	-41000.00	-7.706767	20	PASS
			NV	0	-41000.00	-7.706767	20	PASS
			NV	10	-41000.00	-7.706767	20	PASS
		5500	NV	20	-41000.00	-7.706767	20	PASS
			NV	30	-41000.00	-7.706767	20	PASS
			NV	40	-41000.00	-7.706767	20	PASS
			NV	50	-42000.00	-7.894737	20	PASS
			NV	-30	-43000.00	-7.818182	20	PASS
			NV	-20	-43000.00	-7.818182	20	PASS
			NV	-10	-43000.00	-7.818182	20	PASS
			NV	0	-43000.00	-7.818182	20	PASS
		5580	NV	10	-43000.00	-7.818182	20	PASS
			NV	20	-43000.00	-7.818182	20	PASS
			NV	30	-43000.00	-7.818182	20	PASS
			NV	40	-43000.00	-7.818182	20	PASS
			NV	50	-43000.00	-7.818182	20	PASS
			NV	-30	-44000.00	-7.885305	20	PASS
			NV	-20	-44000.00	-7.885305	20	PASS
			NV	-10	-44000.00	-7.885305	20	PASS
		5700	NV	0	-44000.00	-7.885305	20	PASS
			NV	10	-44000.00	-7.885305	20	PASS
			NV	20	-44000.00	-7.885305	20	PASS
			NV	30	-44000.00	-7.885305	20	PASS
			NV	40	-45000.00	-8.064516	20	PASS
			NV	50	-45000.00	-8.064516	20	PASS
		5700	NV	-30	-45000.00	-7.894737	20	PASS
			NV	-20	-45000.00	-7.894737	20	PASS
			NV	-10	-45000.00	-7.894737	20	PASS
			NV	0	-46000.00	-8.070175	20	PASS
			NV	10	-45000.00	-7.894737	20	PASS
			NV	20	-46000.00	-8.070175	20	PASS

			NV	30	-45000.00	-7.894737	20	PASS
			NV	40	-46000.00	-8.070175	20	PASS
			NV	50	-45000.00	-7.894737	20	PASS
		5720	NV	-30	-46000.00	-8.041958	20	PASS
			NV	-20	-45000.00	-7.867133	20	PASS
			NV	-10	-46000.00	-8.041958	20	PASS
			NV	0	-45000.00	-7.867133	20	PASS
			NV	10	-45000.00	-7.867133	20	PASS
			NV	20	-46000.00	-8.041958	20	PASS
			NV	30	-45000.00	-7.867133	20	PASS
			NV	40	-46000.00	-8.041958	20	PASS
			NV	50	-46000.00	-8.041958	20	PASS
		5745	NV	-30	-46000.00	-8.006963	20	PASS
			NV	-20	-46000.00	-8.006963	20	PASS
			NV	-10	-46000.00	-8.006963	20	PASS
			NV	0	-46000.00	-8.006963	20	PASS
			NV	10	-46000.00	-8.006963	20	PASS
			NV	20	-46000.00	-8.006963	20	PASS
			NV	30	-46000.00	-8.006963	20	PASS
			NV	40	-46000.00	-8.006963	20	PASS
		5785	NV	50	-46000.00	-8.006963	20	PASS
			NV	-30	-46000.00	-7.951599	20	PASS
			NV	-20	-46000.00	-7.951599	20	PASS
			NV	-10	-46000.00	-7.951599	20	PASS
			NV	0	-46000.00	-7.951599	20	PASS
			NV	10	-46000.00	-7.951599	20	PASS
			NV	20	-46000.00	-7.951599	20	PASS
			NV	30	-46000.00	-7.951599	20	PASS
		5825	NV	40	-46000.00	-7.951599	20	PASS
			NV	50	-46000.00	-7.951599	20	PASS
			NV	-30	-46000.00	-7.896996	20	PASS
			NV	-20	-46000.00	-7.896996	20	PASS
			NV	-10	-46000.00	-7.896996	20	PASS
			NV	0	-46000.00	-7.896996	20	PASS
			NV	10	-46000.00	-7.896996	20	PASS
			NV	20	-46000.00	-7.896996	20	PASS
11AX40SIS O	Ant1	5190	NV	30	-46000.00	-7.896996	20	PASS
			NV	40	-46000.00	-7.896996	20	PASS
			NV	50	-46000.00	-7.896996	20	PASS
			NV	-30	-42000.00	-8.092486	20	PASS
			NV	-20	-41000.00	-7.899807	20	PASS
			NV	-10	-42000.00	-8.092486	20	PASS
			NV	0	-42000.00	-8.092486	20	PASS
			NV	10	-42000.00	-8.092486	20	PASS
		5230	NV	20	-42000.00	-8.092486	20	PASS
			NV	30	-42000.00	-8.092486	20	PASS
			NV	40	-42000.00	-8.092486	20	PASS
			NV	50	-42000.00	-8.092486	20	PASS
			NV	-30	-43000.00	-8.221797	20	PASS
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			NV	30	-43000.00	-8.221797	20	PASS
			NV	40	-43000.00	-8.221797	20	PASS
			NV	50	-43000.00	-8.221797	20	PASS
		5270	NV	-30	-42000.00	-7.969639	20	PASS
			NV	-20	-43000.00	-8.159393	20	PASS
			NV	-10	-43000.00	-8.159393	20	PASS



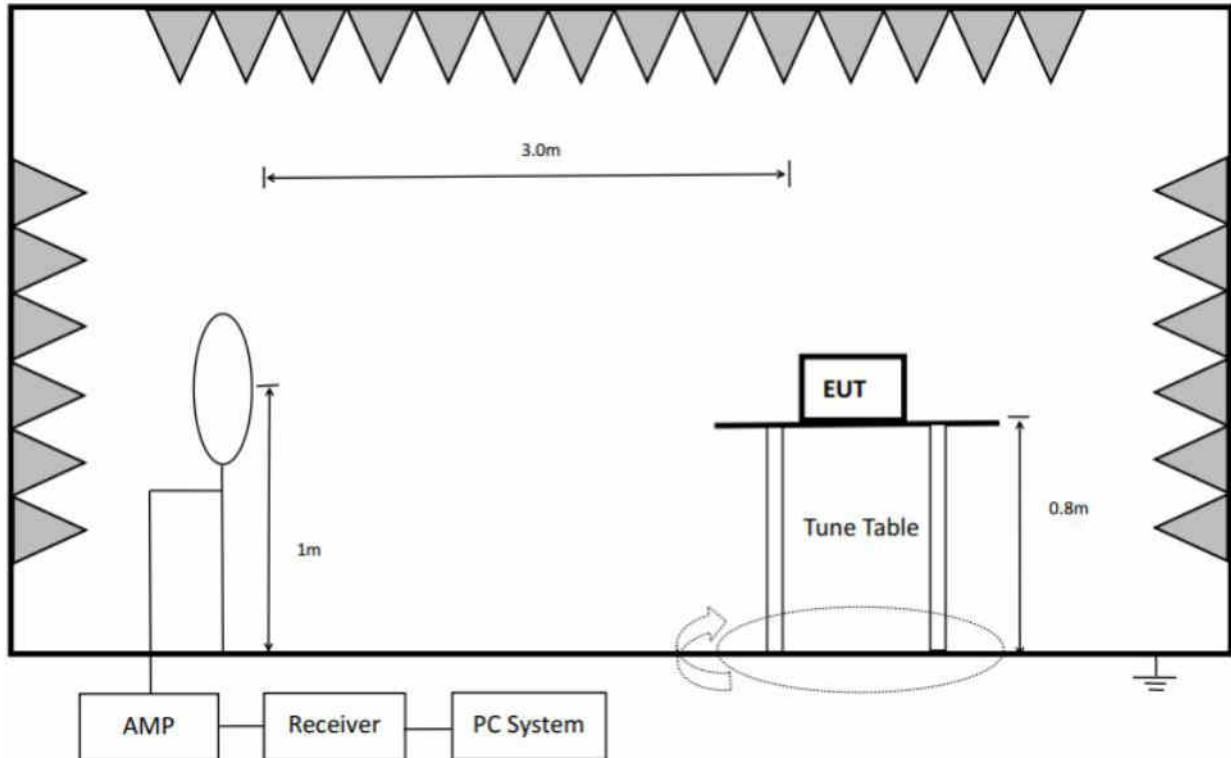
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			NV	40	-43000.00	-8.159393	20	PASS
		5310	NV	50	-43000.00	-8.159393	20	PASS
			NV	-30	-43000.00	-8.097928	20	PASS
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			NV	-10	-44000.00	-8.286252	20	PASS
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			NV	20	-44000.00	-8.286252	20	PASS
			NV	30	-44000.00	-8.286252	20	PASS
			NV	40	-44000.00	-8.286252	20	PASS
			NV	50	-44000.00	-8.286252	20	PASS
		5510	NV	-30	-45000.00	-8.166969	20	PASS
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			NV	40	-45000.00	-8.166969	20	PASS
		5550	NV	50	-45000.00	-8.166969	20	PASS
			NV	-30	-48000.00	-8.648649	20	PASS
			NV	-20	-48000.00	-8.648649	20	PASS
			NV	-10	-47000.00	-8.468468	20	PASS
			NV	0	-48000.00	-8.648649	20	PASS
			NV	10	-47000.00	-8.468468	20	PASS
			NV	20	-47000.00	-8.468468	20	PASS
			NV	30	-47000.00	-8.468468	20	PASS
		5670	NV	40	-47000.00	-8.468468	20	PASS
			NV	50	-47000.00	-8.468468	20	PASS
			NV	-30	-46000.00	-8.112875	20	PASS
			NV	-20	-46000.00	-8.112875	20	PASS
			NV	-10	-46000.00	-8.112875	20	PASS
			NV	0	-46000.00	-8.112875	20	PASS
			NV	10	-47000.00	-8.289242	20	PASS
			NV	20	-46000.00	-8.112875	20	PASS
		5710	NV	30	-46000.00	-8.112875	20	PASS
			NV	40	-47000.00	-8.289242	20	PASS
			NV	50	-46000.00	-8.112875	20	PASS
			NV	-30	-46000.00	-8.056042	20	PASS
			NV	-20	-46000.00	-8.056042	20	PASS
			NV	-10	-46000.00	-8.056042	20	PASS
			NV	0	-46000.00	-8.056042	20	PASS
			NV	10	-46000.00	-8.056042	20	PASS
		5755	NV	20	-46000.00	-8.056042	20	PASS
			NV	30	-46000.00	-8.056042	20	PASS
			NV	40	-46000.00	-8.056042	20	PASS
			NV	50	-46000.00	-8.056042	20	PASS
			NV	-30	-46000.00	-7.993050	20	PASS
			NV	-20	-46000.00	-7.993050	20	PASS
			NV	-10	-46000.00	-7.993050	20	PASS
			NV	0	-47000.00	-8.166811	20	PASS
		5755	NV	10	-47000.00	-8.166811	20	PASS
			NV	20	-47000.00	-8.166811	20	PASS
			NV	30	-47000.00	-8.166811	20	PASS
			NV	40	-47000.00	-8.166811	20	PASS
			NV	50	-47000.00	-8.166811	20	PASS
			NV	50	-47000.00	-8.166811	20	PASS
			NV	50	-47000.00	-8.166811	20	PASS

		5795	NV	-30	-47000.00	-8.110440	20	PASS
			NV	-20	-47000.00	-8.110440	20	PASS
			NV	-10	-47000.00	-8.110440	20	PASS
			NV	0	-47000.00	-8.110440	20	PASS
			NV	10	-47000.00	-8.110440	20	PASS
			NV	20	-47000.00	-8.110440	20	PASS
			NV	30	-47000.00	-8.110440	20	PASS
			NV	40	-47000.00	-8.110440	20	PASS
			NV	50	-47000.00	-8.110440	20	PASS

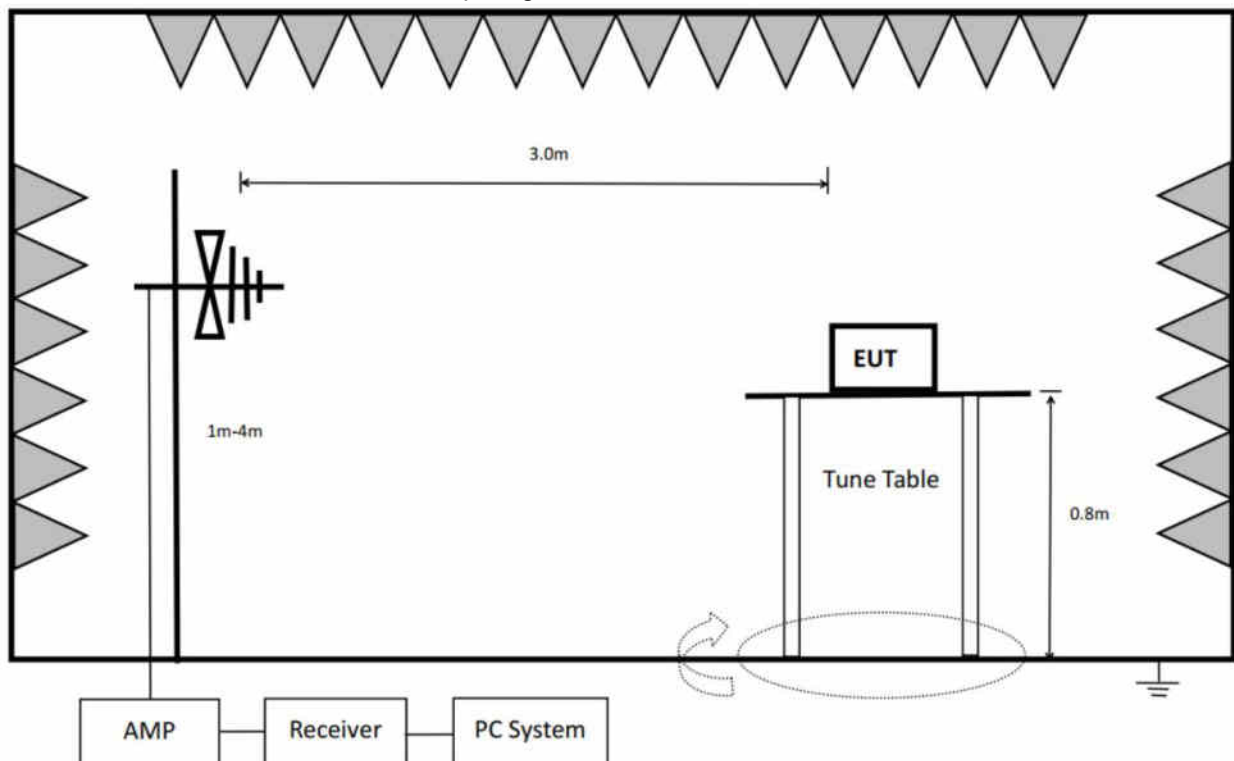
### 13. Radiated Emission

#### 13.1. Block Diagram of Test Setup

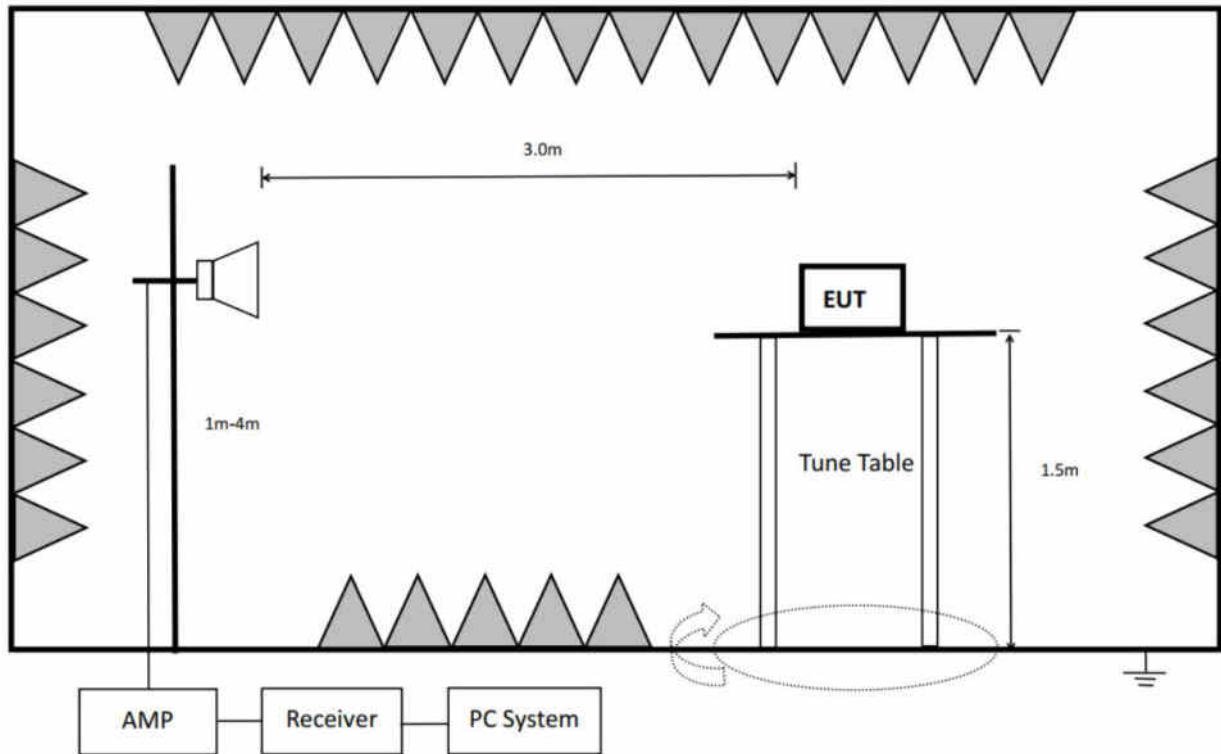
In 3 m Anechoic Chamber, test setup diagram for 9 kHz - 30 MHz:



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

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
<sup>1</sup> 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	( <sup>2</sup> )
13.36-13.41			

<sup>1</sup>Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup>Above 38.6

## (2) FCC 15.209 Limit.

Frequency MHz	Distance Meters	Field strengths limit	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
0.009 ~ 0.490	300	2400/F(kHz)	67.6-20log(F)
0.490 ~ 1.705	30	24000/F(kHz)	87.6-20log(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 dB( $\mu\text{V}$ )/m (Peak) 54.0 dB( $\mu\text{V}$ )/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 dBm / 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 dBm / 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 dBm / 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 dBm / 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 dBm/MHz Limit=95.2+EIRP (dBm)=95.2-27=68.2 dB $\mu\text{V}/\text{m}$

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:

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

(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 C63.10-2013

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 C63.10-2013.

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 C63.10-2013.

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















11AX20SISO\_Ant1\_High\_5825



11AX40SISO\_Ant1\_Low\_5755



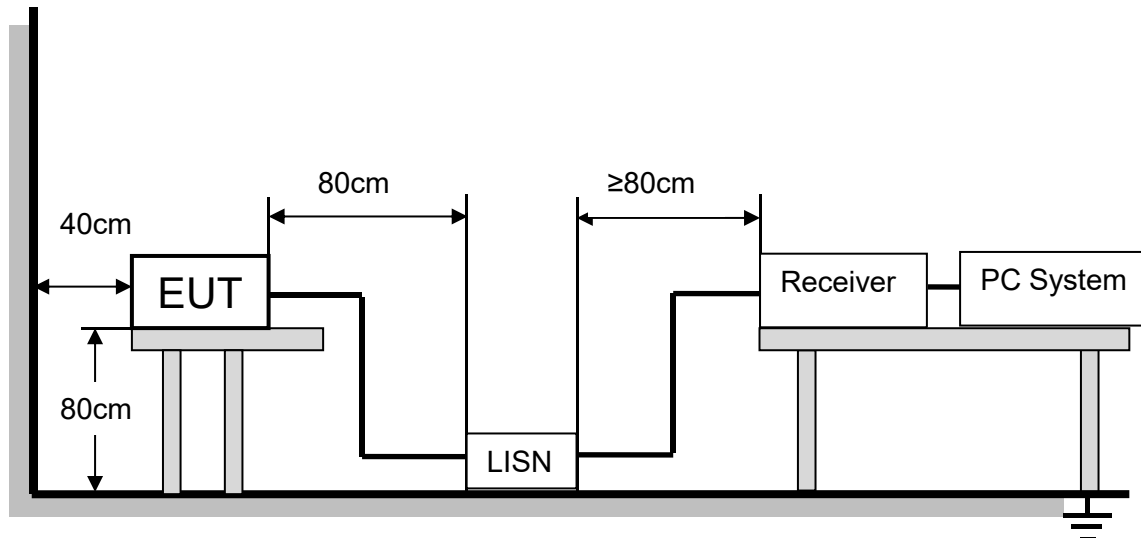
11AX40SISO\_Ant1\_High\_5795





## 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 C63.10-2013. 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.

#### **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		
	<input type="checkbox"/> Master	<input checked="" type="checkbox"/> Client Without Radar Detection	<input type="checkbox"/> 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	
	<input type="checkbox"/> Master Device or Client with Radar Detection	<input checked="" type="checkbox"/> 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	<input type="checkbox"/> Master Device or Client with Radar Detection	<input checked="" type="checkbox"/> 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
<p>Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.</p> <p>Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a</p> <p>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</p>					

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

Test B and must also be unique and not repeated from the previous waveforms in Tests A or B. Test aggregate is average of the percentage of successful detections of short pulse radar types 1-4

#### 15.4. Calibration of Radar Waveform

Radar Waveform Calibration Procedure:

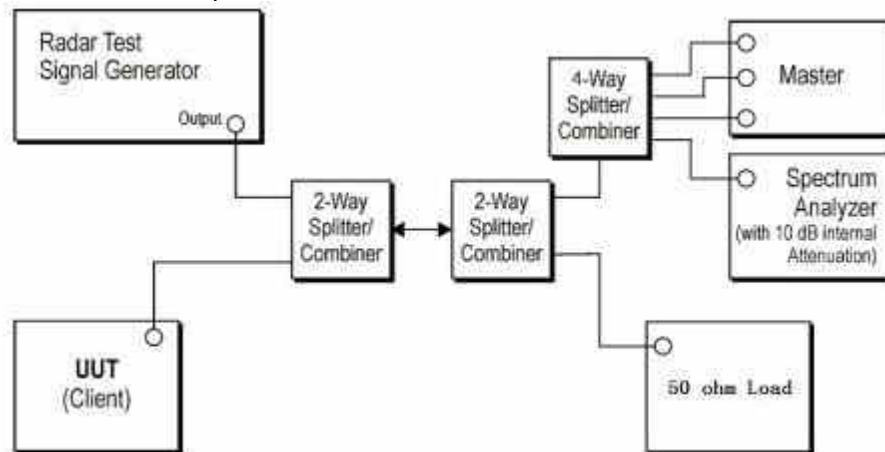
A 50 ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to place of the master

The interference Radar Detection Threshold Level is  $-62\text{dBm} + 0\text{dBi} + 1\text{dB} = -61\text{dBm}$  that had been taken into account the output power range and antenna gain.

The following equipment setup was used to calibrate the conducted radar waveform. A vector signal generator was utilized to establish the test signal level for radar type 0. During this process there were no transmissions by either the master or client device. The spectrum analyzer was switched to the zero spans (time domain) at the frequency of the radar waveform generator. Peak detection was used. The spectrum analyzer resolution bandwidth (RBW) and video bandwidth (VBW) were set to 3 MHz. The spectrum analyzer had offset -1.0dB to compensate RF cable loss 1.0dB.

The vector signal generator amplitude was set so that the power level measured at the spectrum analyzer was  $-62\text{dBm} + 0\text{dBi} + 1\text{dB} = -61\text{dBm}$ . Capture the spectrum analyzer plots on short pulse radar waveform.

Conducted Calibration Setup:



Note: 1. Use the software "Web" to set the frequency channel.

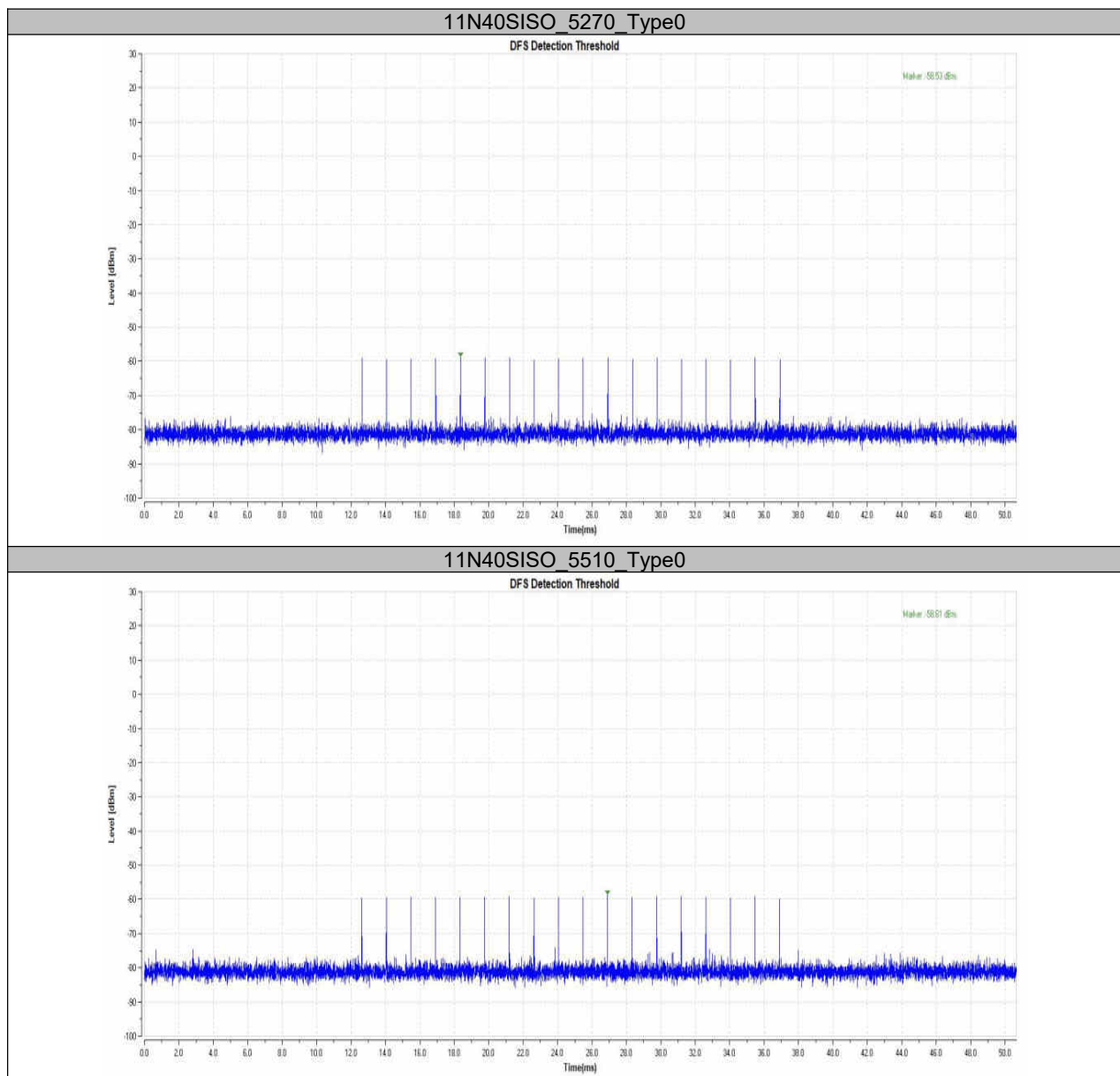
2. EUT is not support TPC and not with Radar detection.

Radar Waveform Calibration Result:

Radar Type 0

TestMode	Frequency[dbm]	Radar Type	Result	Limit[dbm]	Verdict
11N40SISO	5270	Type0	-58.53	-58.47	PASS
	5510	Type0	-58.61	-58.47	PASS





### 15.5. Channel Closing Transmission Time, Channel Move Time and Non-Occupancy Period

Block diagram of test setup Test Procedure:

The radar pulse generator is setup to provide a pulse at frequency that the master and client are operating. A type 0 radar pulse with a 1us pulse width and a 1428us PRI is used for the testing.

The vector signal generator is adjusted to provide the radar burst (18 pulses) at the level of approximately -61dBm at the antenna port of the master device.

A trigger is provided from the pulse generator to the DFS monitoring system in order to capture the traffic and the occurrence of the radar pulse.

EUT will associate with the master at channel. The file "iperf.exe" specified by the FCC is streamed from the PC 2 through the master and the client device to the PC 1 and played in full motion video using Test Software in order to properly load the network for the entire period of the test.

When radar burst with a level equal to the DFS Detection Threshold +1dB is generated on the operating channel of the U-NII device. At time T0 the radar waveform generator sends a burst of pulse of the radar waveform at Detection Threshold +1dB.

Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel. Measure and record the transmissions from the UUT during the observation time (Channel Move Time). One 15 seconds plot is reported for the Short Pulse Radar Type 0. The plot for the Short Pulse Radar Types start at the end of the radar burst. The Channel Move Time will be calculated based on the zoom in 600ms plot of the Short Pulse Radar Type.

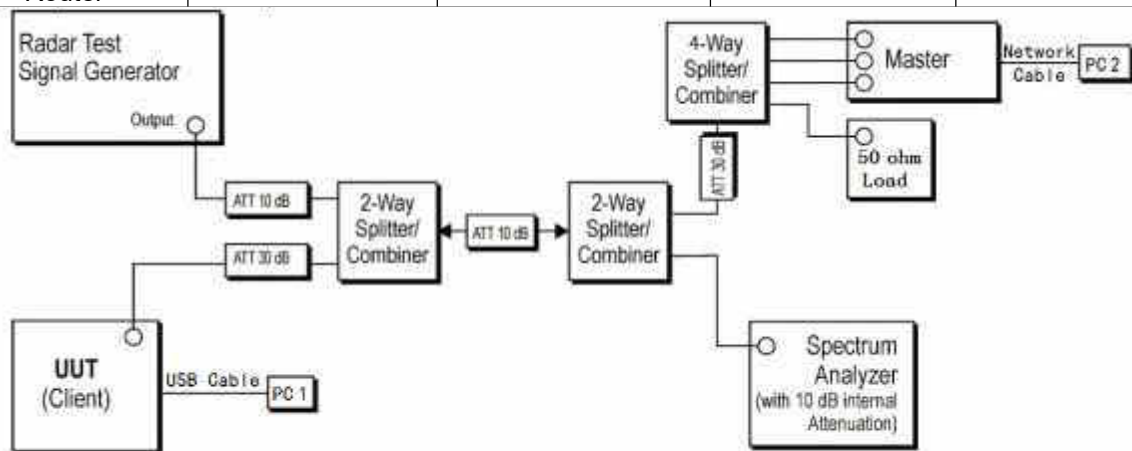
Measurement of the aggregate duration of the Channel Closed Transmission Time method. With the spectrum analyzer set to zero span tuned to the center frequency of the EUT operating channel at the radar simulated frequency, peak detection, and max hold, the dwell time per bin is given by:  $Dwell (0.3ms) = S (12000ms) / B (4000)$ ; where Dwell is the dwell time per spectrum analyzer sampling bin, S is sweep time and B is the number of spectrum analyzer sampling bins. An upper bound of the aggregate duration of the intermittent control signals of Channel Closing Transmission Time is calculated by:  $C (ms) = N \times Dwell (0.3ms)$ ; where C is the Closing Time, N is the number of spectrum analyzer sampling bins (intermittent control signals) showing a U-NII transmission and Dwell is the dwell time per bin.

Measurement the EUT for more than 30 minutes following the channel move time to verify that no transmission or beacons occur on this channel.

### 15.6. Test Setup

Setup for Client with injection at the Master

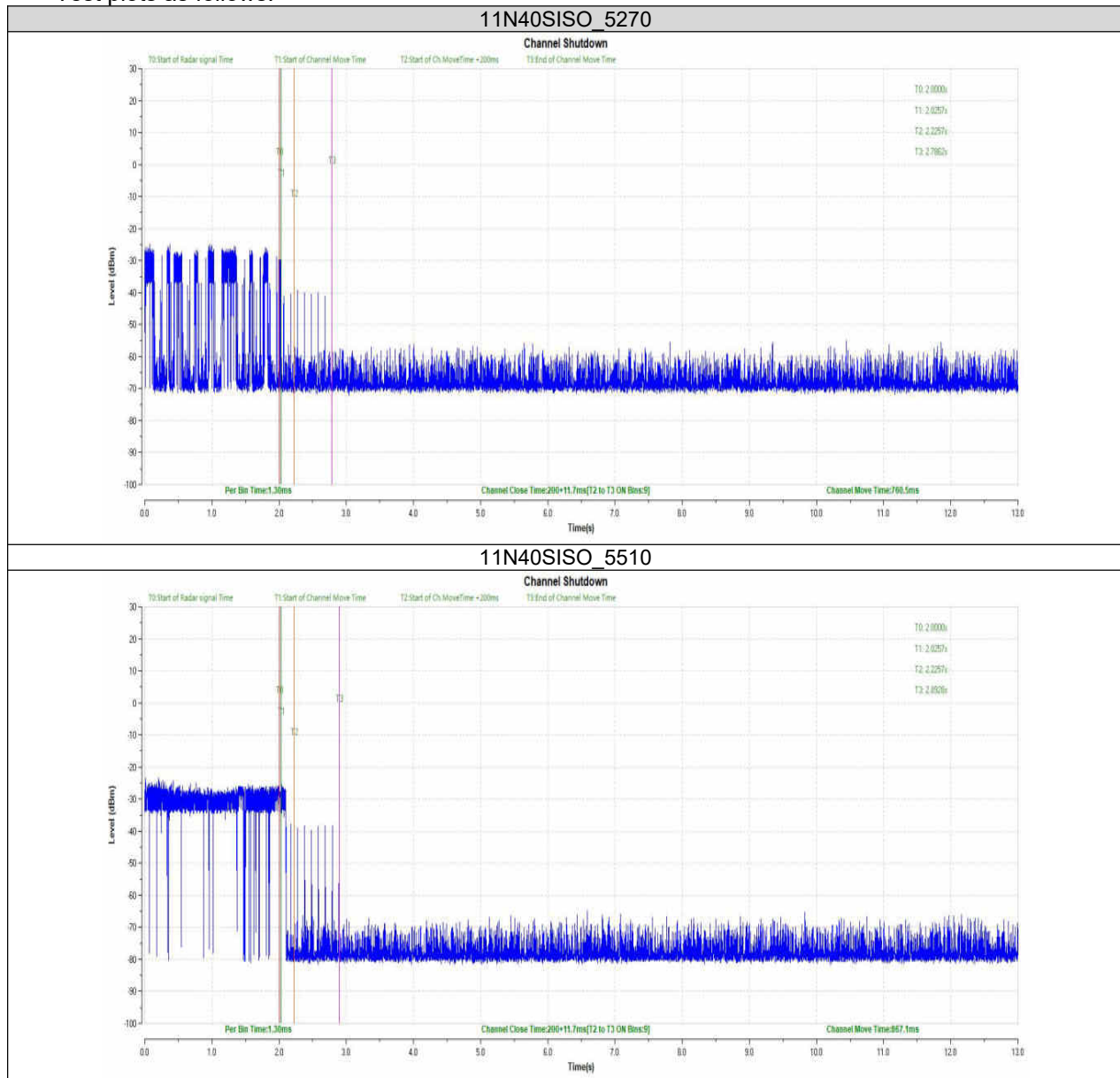
Master Name	Brand Name	Model Name	FCC ID	Run-up Time(s)
ROG Rapture Tri-band Gaming Router	ASUS	GT-AXE11000	MSQ-RTAXJF00	90



### 15.7. Test Result

BW/Channel	Test Item	Test Result	Limit	Results
40M/5270MHz	Channel Move Time	0.76	<10s	pass
	Channel Closing Transmission Time	0.211	<0.26s	pass
40M/5510MHz	Channel Move Time	0.87	<10s	pass
	Channel Closing Transmission Time	0.211	<0.26s	pass

Test plots as follows:



## **16. Antenna Requirements**

### **16.1. Applicable Requirements**

Please refer to FCC §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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Please refer to FCC §15.247(b)(4)

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### **16.2. Result**

The antenna used for this product is FPC antenna and 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 3.53 dBi.

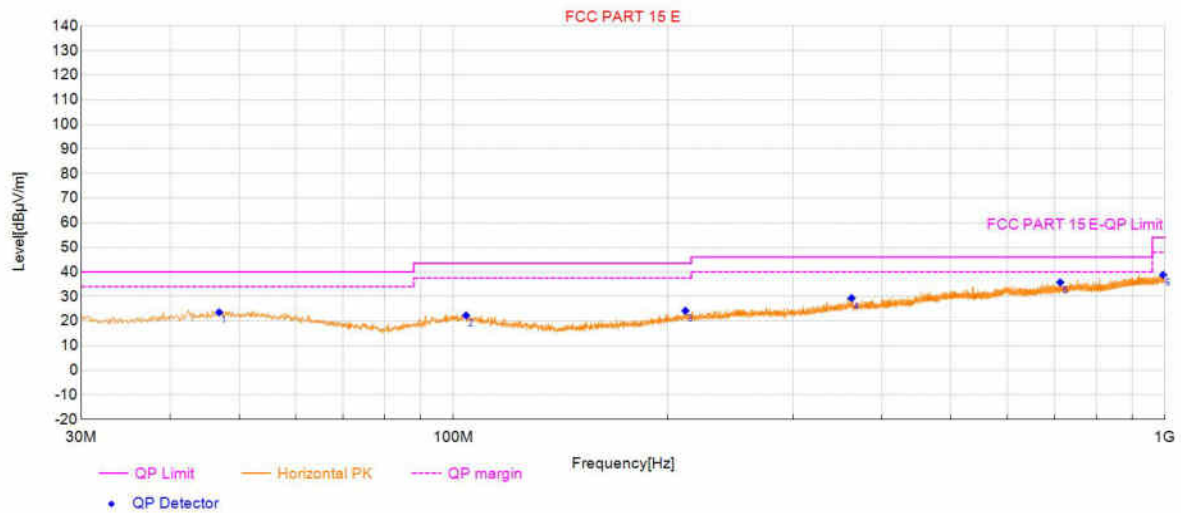
## APPENDIX A - Radiated Emission Below 1GHz Test Data

### Test Report

Project Information			
Customer:			
EUT:	Seedpace Interactive Player		
Model:	XHS10A	SN:	
Mode:	11N40_5755	Voltage:	5V= 1A
Environment:	Temp: 25℃; Humi:60%	Engineer:	Soho Liu
Remark:	Power Set:Default		
Test Standard: FCC PART 15 E			

Start of Test:2025-05-15 19:36:48

#### Test Graph



#### Final Data List

NO.	Frequency [MHz]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	46.8797	21.38	23.56	40.00	16.44	100	286	Horizontal	PASS
2	104.2124	19.80	22.30	43.50	21.20	100	350	Horizontal	PASS
3	211.8932	20.56	24.20	43.50	19.30	100	235	Horizontal	PASS
4	362.7433	24.85	29.34	46.00	16.66	100	320	Horizontal	PASS
5	712.4632	31.18	35.76	46.00	10.24	100	39	Horizontal	PASS
6	994.0824	35.24	38.77	54.00	15.23	100	180	Horizontal	PASS

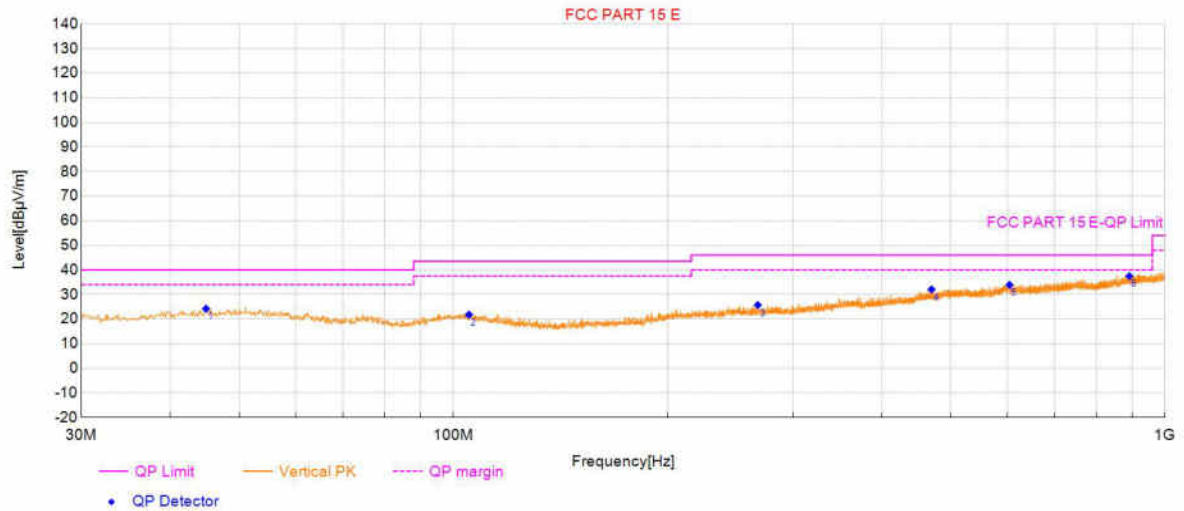


# Test Report

Project Information			
Customer:			
EUT:	Seedpace Interactive Player		
Model:	XHS10A	SN:	
Mode:	11N40_5755	Voltage:	5V <sub>DC</sub> 1A
Environment:	Temp: 25℃; Humi:60%	Engineer:	Soho Liu
Remark:	Power Set:Default		
Test Standard: FCC PART 15 E			

Start of Test:2025-05-15 19:37:30

## Test Graph



## Final Data List

NO.	Frequency [MHz]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	44.9395	21.25	24.22	40.00	15.78	100	20	Vertical	PASS
2	105.1825	19.74	21.82	43.50	21.68	100	2	Vertical	PASS
3	267.7708	22.01	25.72	46.00	20.28	100	287	Vertical	PASS
4	469.7450	27.31	32.07	46.00	13.93	100	181	Vertical	PASS
5	604.5885	29.98	33.90	46.00	12.10	100	110	Vertical	PASS
6	890.9611	33.99	37.47	46.00	8.53	100	350	Vertical	PASS

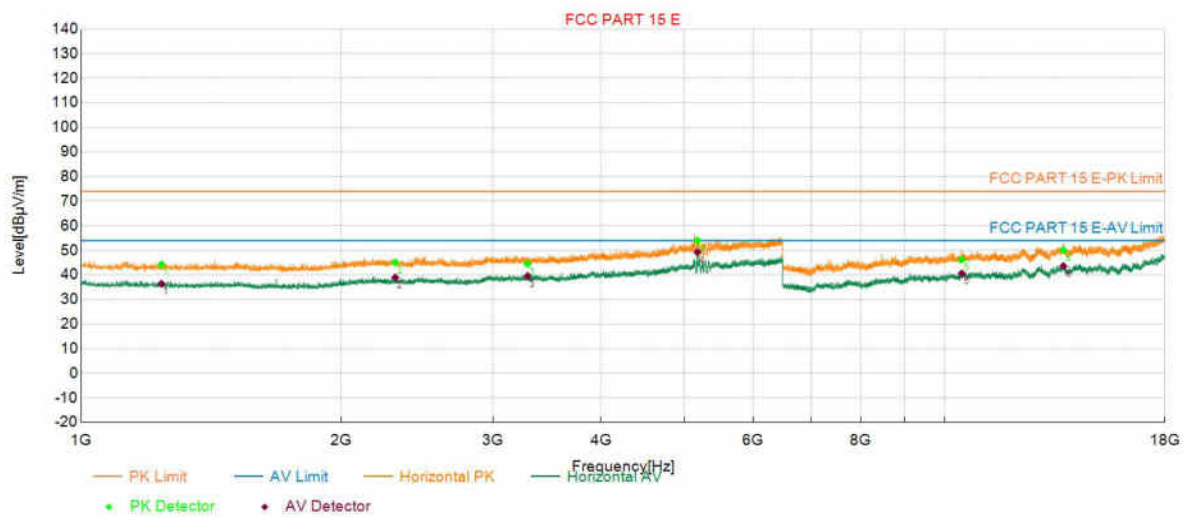
## APPENDIX B – Radiated Emission Above 1GHz Test Data

### Test Report

Project Information			
Customer:			
EUT:	Seedpace Interactive Player		
Model:	XHS10A	SN:	
Mode:	11N40_5190	Voltage:	5V== 1A
Environment:	Temp: 25℃; Humi:60%	Engineer:	Soho Liu
Remark:	Power Set:Default		
Test Standard: FCC PART 15 E			

Start of Test:2025-05-14 10:05:56

#### Test Graph



#### PK Final Data List

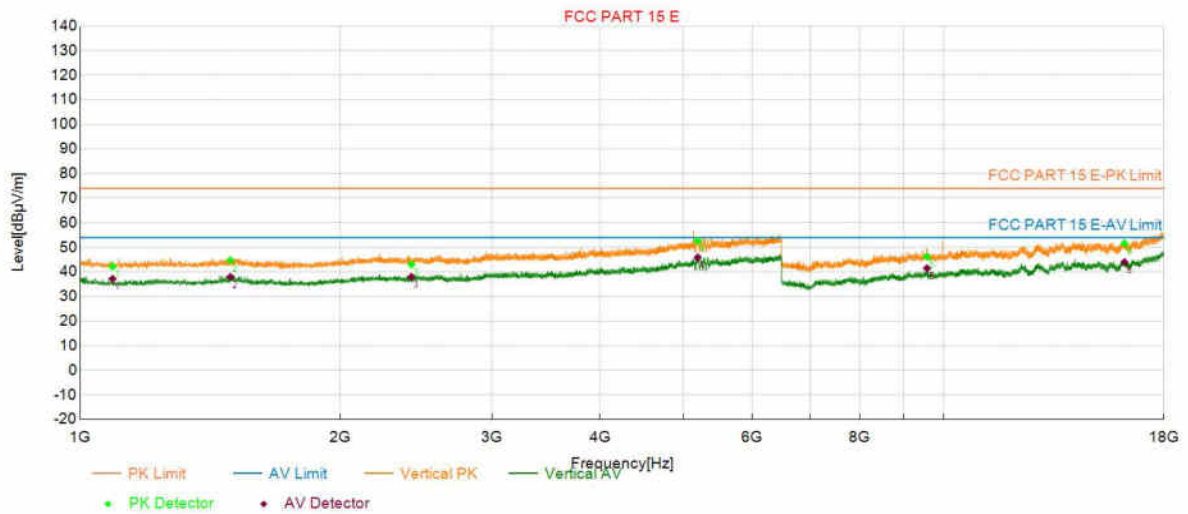
NO.	Frequency [MHz]	Factor [dB]	PK Value [dBμV/m]	PK Limit [dBμV/m]	PK Margin [dB]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1238.7239	3.59	44.29	74.00	29.71	36.40	54.00	17.60	150	245	Horizontal
2	2310.7811	8.03	45.03	74.00	28.97	38.95	54.00	15.05	150	360	Horizontal
3	3288.7789	11.39	44.55	74.00	29.45	39.56	54.00	14.44	150	142	Horizontal
4	5173.2673	19.86	54.02	74.00	19.98	49.24	54.00	4.76	150	174	Horizontal
5	10469.0469	6.94	46.23	74.00	27.77	40.57	54.00	13.43	150	184	Horizontal
6	13728.4728	12.95	50.11	74.00	23.89	43.58	54.00	10.42	150	0	Horizontal

# Test Report

Project Information			
Customer:			
EUT:	Seedpace Interactive Player		
Model:	XHS10A	SN:	
Mode:	11N40_5190	Voltage:	5V $\approx$ 1A
Environment:	Temp: 25℃; Humi:60%	Engineer:	Soho Liu
Remark:	Power Set:Default		
Test Standard: FCC PART 15 E			

Start of Test:2025-05-14 10:07:17

## Test Graph



## PK Final Data List

NO.	Frequency [MHz]	Factor [dB]	PK Value [dBμV/m]	PK Limit [dBμV/m]	PK Margin [dB]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1090.2090	2.55	42.20	74.00	31.80	37.17	54.00	16.83	150	106	Vertical
2	1492.8493	4.43	44.76	74.00	29.24	37.95	54.00	16.05	150	124	Vertical
3	2419.1419	8.11	43.08	74.00	30.92	38.00	54.00	16.00	150	173	Vertical
4	5191.4191	19.90	52.59	74.00	21.41	45.87	54.00	8.13	150	234	Vertical
5	9568.5069	5.36	46.21	74.00	27.79	41.45	54.00	12.55	150	118	Vertical
6	16198.9199	13.76	51.60	74.00	22.40	43.96	54.00	10.04	150	172	Vertical