

10. Frequency Stability Measurement

10.1. 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.

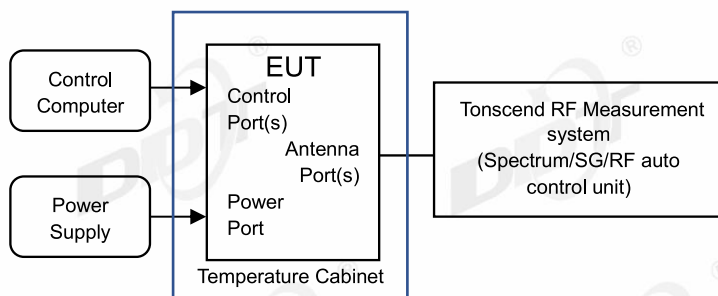
10.2. Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

10.3. 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.

10.4. Test setup



10.5. Test result

Test Engineer:	Zhongyao	Test Site:	RF Measurement System 3#
Ambient Condition:	26.1℃,38.6%RH	Test Date:	2024.07.07-2024.07.30
Test Power Supply:	DC 12V	Sample Number:	S24062520-003

Voltage								
Test Mode	Antenna	Frequency[MHz]	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
11A	Ant1	5180	NV	NT	-20000.00	-3.861004	20	PASS
			LV	NT	-20000.00	-3.861004	20	PASS
			HV	NT	-20000.00	-3.861004	20	PASS
	Ant2	5180	NV	NT	-20000.00	-3.861004	20	PASS
			LV	NT	-60000.00	-11.583012	20	PASS
			HV	NT	-60000.00	-11.583012	20	PASS
	Ant1	5200	NV	NT	-20000.00	-3.846154	20	PASS
			LV	NT	-40000.00	-7.692308	20	PASS
			HV	NT	-40000.00	-7.692308	20	PASS
	Ant2	5200	NV	NT	-20000.00	-3.846154	20	PASS
			LV	NT	-40000.00	-7.692308	20	PASS
			HV	NT	-40000.00	-7.692308	20	PASS
	Ant1	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
	Ant2	5240	NV	NT	-20000.00	-3.816794	20	PASS
			LV	NT	-40000.00	-7.633588	20	PASS
			HV	NT	-60000.00	-11.450382	20	PASS
	Ant1	5260	NV	NT	-40000.00	-7.604563	20	PASS
			LV	NT	-40000.00	-7.604563	20	PASS
			HV	NT	-40000.00	-7.604563	20	PASS
	Ant2	5260	NV	NT	-20000.00	-3.802281	20	PASS
			LV	NT	-40000.00	-7.604563	20	PASS
			HV	NT	-40000.00	-7.604563	20	PASS
	Ant1	5280	NV	NT	-40000.00	-7.575758	20	PASS
			LV	NT	-20000.00	-3.787879	20	PASS
			HV	NT	-20000.00	-3.787879	20	PASS
	Ant2	5280	NV	NT	-20000.00	-3.787879	20	PASS
			LV	NT	-20000.00	-3.787879	20	PASS
			HV	NT	-20000.00	-3.787879	20	PASS
	Ant1	5320	NV	NT	-40000.00	-7.518797	20	PASS
			LV	NT	-40000.00	-7.518797	20	PASS
			HV	NT	-20000.00	-3.759398	20	PASS
	Ant2	5320	NV	NT	-20000.00	-3.759398	20	PASS
			LV	NT	-20000.00	-3.759398	20	PASS
			HV	NT	-40000.00	-7.518797	20	PASS
	Ant1	5500	NV	NT	-20000.00	-3.636364	20	PASS
			LV	NT	-20000.00	-3.636364	20	PASS
			HV	NT	-20000.00	-3.636364	20	PASS
	Ant2	5500	NV	NT	-20000.00	-3.636364	20	PASS
			LV	NT	-20000.00	-3.636364	20	PASS
			HV	NT	-20000.00	-3.636364	20	PASS
	Ant1	5580	NV	NT	-40000.00	-7.168459	20	PASS
			LV	NT	-40000.00	-7.168459	20	PASS
			HV	NT	-40000.00	-7.168459	20	PASS
	Ant2	5580	NV	NT	-20000.00	-3.584229	20	PASS
			LV	NT	-20000.00	-3.584229	20	PASS
			HV	NT	-20000.00	-3.584229	20	PASS
	Ant1	5700	NV	NT	-40000.00	-7.017544	20	PASS
			LV	NT	-20000.00	-3.508772	20	PASS
			HV	NT	-20000.00	-3.508772	20	PASS
	Ant2	5700	NV	NT	-40000.00	-7.017544	20	PASS
			LV	NT	-40000.00	-7.017544	20	PASS

	Ant1	5720	HV	NT	-20000.00	-3.508772	20	PASS
			NV	NT	-40000.00	-6.993007	20	PASS
			LV	NT	-40000.00	-6.993007	20	PASS
	Ant2	5720	HV	NT	-20000.00	-3.496503	20	PASS
			NV	NT	-40000.00	-6.993007	20	PASS
			LV	NT	-40000.00	-6.993007	20	PASS
	Ant1	5745	HV	NT	-40000.00	-6.993007	20	PASS
			NV	NT	-40000.00	-6.962576	20	PASS
			LV	NT	-40000.00	-6.962576	20	PASS
	Ant2	5745	HV	NT	-20000.00	-3.481288	20	PASS
			NV	NT	-20000.00	-3.481288	20	PASS
			LV	NT	-20000.00	-3.481288	20	PASS
	Ant1	5785	HV	NT	-20000.00	-3.457217	20	PASS
			NV	NT	-20000.00	-3.457217	20	PASS
			LV	NT	-20000.00	-3.457217	20	PASS
	Ant2	5785	HV	NT	-20000.00	-3.457217	20	PASS
			NV	NT	-20000.00	-3.457217	20	PASS
			LV	NT	-20000.00	-3.457217	20	PASS
	Ant1	5825	HV	NT	-40000.00	-6.866953	20	PASS
			NV	NT	-40000.00	-6.866953	20	PASS
			LV	NT	-40000.00	-6.866953	20	PASS
	Ant2	5825	HV	NT	-20000.00	-3.433476	20	PASS
			NV	NT	-20000.00	-3.433476	20	PASS
			LV	NT	-20000.00	-3.433476	20	PASS
11N40MIMO	Ant1	5190	HV	NT	-40000.00	-7.707129	20	PASS
			NV	NT	-40000.00	-7.707129	20	PASS
			LV	NT	-40000.00	-7.707129	20	PASS
	Ant2	5190	HV	NT	0.00	0.000000	20	PASS
			NV	NT	0.00	0.000000	20	PASS
			LV	NT	0.00	0.000000	20	PASS
	Ant1	5230	HV	NT	0.00	0.000000	20	PASS
			NV	NT	0.00	0.000000	20	PASS
			LV	NT	0.00	0.000000	20	PASS
	Ant2	5230	HV	NT	0.00	0.000000	20	PASS
			NV	NT	0.00	0.000000	20	PASS
			LV	NT	0.00	0.000000	20	PASS
	Ant1	5270	HV	NT	0.00	0.000000	20	PASS
			NV	NT	0.00	0.000000	20	PASS
			LV	NT	0.00	0.000000	20	PASS
	Ant2	5270	HV	NT	0.00	0.000000	20	PASS
			NV	NT	0.00	0.000000	20	PASS
			LV	NT	0.00	0.000000	20	PASS
	Ant1	5310	HV	NT	0.00	0.000000	20	PASS
			NV	NT	0.00	0.000000	20	PASS
			LV	NT	0.00	0.000000	20	PASS
	Ant2	5310	HV	NT	-40000.00	-7.532957	20	PASS
			NV	NT	0.00	0.000000	20	PASS
			LV	NT	-40000.00	-7.532957	20	PASS
	Ant1	5510	HV	NT	0.00	0.000000	20	PASS
			NV	NT	0.00	0.000000	20	PASS
			LV	NT	0.00	0.000000	20	PASS
	Ant2	5510	HV	NT	0.00	0.000000	20	PASS
			NV	NT	0.00	0.000000	20	PASS
			LV	NT	0.00	0.000000	20	PASS
	Ant1	5550	HV	NT	-40000.00	-7.259528	20	PASS
			NV	NT	0.00	0.000000	20	PASS
			LV	NT	0.00	0.000000	20	PASS
	Ant2	5550	HV	NT	0.00	0.000000	20	PASS
			NV	NT	0.00	0.000000	20	PASS
			LV	NT	-40000.00	-7.207207	20	PASS
	Ant1	5670	HV	NT	0.00	0.000000	20	PASS
			NV	NT	0.00	0.000000	20	PASS
			LV	NT	0.00	0.000000	20	PASS

	Ant2	5670	NV	NT	0.00	0.000000	20	PASS
			LV	NT	0.00	0.000000	20	PASS
			HV	NT	0.00	0.000000	20	PASS
	Ant1	5710	NV	NT	-40000.00	-7.005254	20	PASS
			LV	NT	-40000.00	-7.005254	20	PASS
			HV	NT	-40000.00	-7.005254	20	PASS
	Ant2	5710	NV	NT	0.00	0.000000	20	PASS
			LV	NT	0.00	0.000000	20	PASS
			HV	NT	0.00	0.000000	20	PASS
	Ant1	5755	NV	NT	0.00	0.000000	20	PASS
			LV	NT	0.00	0.000000	20	PASS
			HV	NT	0.00	0.000000	20	PASS
	Ant2	5755	NV	NT	0.00	0.000000	20	PASS
			LV	NT	0.00	0.000000	20	PASS
			HV	NT	0.00	0.000000	20	PASS
	Ant1	5795	NV	NT	0.00	0.000000	20	PASS
			LV	NT	-40000.00	-6.902502	20	PASS
			HV	NT	-40000.00	-6.902502	20	PASS
	Ant2	5795	NV	NT	-40000.00	-6.902502	20	PASS
			LV	NT	-40000.00	-6.902502	20	PASS
			HV	NT	-40000.00	-6.902502	20	PASS
11AC80MIMO	Ant1	5210	NV	NT	0.00	0.000000	20	PASS
			LV	NT	0.00	0.000000	20	PASS
			HV	NT	0.00	0.000000	20	PASS
	Ant2	5210	NV	NT	0.00	0.000000	20	PASS
			LV	NT	0.00	0.000000	20	PASS
			HV	NT	-40000.00	-7.005254	20	PASS
	Ant1	5290	NV	NT	0.00	0.000000	20	PASS
			LV	NT	-40000.00	-7.005254	20	PASS
			HV	NT	0.00	0.000000	20	PASS
	Ant2	5290	NV	NT	80000.00	15.122873	20	PASS
			LV	NT	80000.00	15.122873	20	PASS
			HV	NT	80000.00	15.122873	20	PASS
	Ant1	5530	NV	NT	0.00	0.000000	20	PASS
			LV	NT	0.00	0.000000	20	PASS
			HV	NT	0.00	0.000000	20	PASS
	Ant2	5530	NV	NT	-80000.00	-14.260250	20	PASS
			LV	NT	-80000.00	-14.260250	20	PASS
			HV	NT	-80000.00	-14.260250	20	PASS
	Ant1	5610	NV	NT	-80000.00	-14.260250	20	PASS
			LV	NT	80000.00	14.260250	20	PASS
			HV	NT	80000.00	14.260250	20	PASS
	Ant2	5610	NV	NT	-80000.00	-14.260250	20	PASS
			LV	NT	80000.00	14.260250	20	PASS
			HV	NT	-80000.00	-14.260250	20	PASS
	Ant1	5690	NV	NT	0.00	0.000000	20	PASS
			LV	NT	0.00	0.000000	20	PASS
			HV	NT	-80000.00	-14.260250	20	PASS
	Ant2	5690	NV	NT	0.00	0.000000	20	PASS
			LV	NT	0.00	0.000000	20	PASS
			HV	NT	0.00	0.000000	20	PASS
	Ant1	5775	NV	NT	-80000.00	-13.852814	20	PASS
			LV	NT	80000.00	13.852814	20	PASS
			HV	NT	80000.00	13.852814	20	PASS
	Ant2	5775	NV	NT	80000.00	13.852814	20	PASS
			LV	NT	0.00	0.000000	20	PASS
			HV	NT	80000.00	13.852814	20	PASS

Temperature								
Test Mode	Antenna	Frequency[MHz]	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
11A	Ant1	5180	NV	0	-20000.00	-3.861004	20	PASS
			NV	10	-40000.00	-7.722008	20	PASS

			NV	20	-20000.00	-3.861004	20	PASS
			NV	30	-20000.00	-3.861004	20	PASS
			NV	40	-20000.00	-3.861004	20	PASS
			NV	50	-40000.00	-7.722008	20	PASS
			NV	60	-20000.00	-3.861004	20	PASS
			NV	70	-20000.00	-3.861004	20	PASS
	Ant2	5180	NV	0	-40000.00	-7.722008	20	PASS
			NV	10	-40000.00	-7.722008	20	PASS
			NV	20	-40000.00	-7.722008	20	PASS
			NV	30	-40000.00	-7.722008	20	PASS
			NV	40	-40000.00	-7.722008	20	PASS
			NV	50	-40000.00	-7.722008	20	PASS
			NV	60	-40000.00	-7.722008	20	PASS
			NV	70	-40000.00	-7.722008	20	PASS
	Ant1	5200	NV	0	-20000.00	-3.846154	20	PASS
			NV	10	-20000.00	-3.846154	20	PASS
			NV	20	-20000.00	-3.846154	20	PASS
			NV	30	-20000.00	-3.846154	20	PASS
			NV	40	-20000.00	-3.846154	20	PASS
			NV	50	-40000.00	-7.692308	20	PASS
			NV	60	-40000.00	-7.692308	20	PASS
			NV	70	-20000.00	-3.846154	20	PASS
	Ant2	5200	NV	0	-20000.00	-3.846154	20	PASS
			NV	10	-20000.00	-3.846154	20	PASS
			NV	20	-40000.00	-7.692308	20	PASS
			NV	30	-20000.00	-3.846154	20	PASS
			NV	40	-40000.00	-7.692308	20	PASS
			NV	50	-40000.00	-7.692308	20	PASS
			NV	60	-40000.00	-7.692308	20	PASS
			NV	70	-40000.00	-7.692308	20	PASS
	Ant1	5240	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
			NV	60	-40000.00	-7.633588	20	PASS
			NV	70	-40000.00	-7.633588	20	PASS
	Ant2	5240	NV	0	-40000.00	-7.633588	20	PASS
			NV	10	-40000.00	-7.633588	20	PASS
			NV	20	-60000.00	-11.450382	20	PASS
			NV	30	-60000.00	-11.450382	20	PASS
			NV	40	-20000.00	-3.816794	20	PASS
			NV	50	-40000.00	-7.633588	20	PASS
			NV	60	-40000.00	-7.633588	20	PASS
			NV	70	-20000.00	-3.816794	20	PASS
	Ant1	5260	NV	0	-40000.00	-7.604563	20	PASS
			NV	10	-40000.00	-7.604563	20	PASS
			NV	20	-40000.00	-7.604563	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
			NV	60	-40000.00	-7.604563	20	PASS
			NV	70	-40000.00	-7.604563	20	PASS
	Ant2	5260	NV	0	-40000.00	-7.604563	20	PASS
			NV	10	-40000.00	-7.604563	20	PASS
			NV	20	-40000.00	-7.604563	20	PASS
			NV	30	-40000.00	-7.604563	20	PASS
			NV	40	-20000.00	-3.802281	20	PASS
			NV	50	-20000.00	-3.802281	20	PASS
			NV	60	-40000.00	-7.604563	20	PASS
			NV	70	-40000.00	-7.604563	20	PASS
	Ant1	5280	NV	0	-20000.00	-3.787879	20	PASS
			NV	10	-20000.00	-3.787879	20	PASS

			NV	20	-20000.00	-3.787879	20	PASS
			NV	30	-40000.00	-7.575758	20	PASS
			NV	40	-40000.00	-7.575758	20	PASS
			NV	50	-40000.00	-7.575758	20	PASS
			NV	60	-20000.00	-3.787879	20	PASS
			NV	70	-40000.00	-7.575758	20	PASS
	Ant2	5280	NV	0	-20000.00	-3.787879	20	PASS
			NV	10	-20000.00	-3.787879	20	PASS
			NV	20	-20000.00	-3.787879	20	PASS
			NV	30	-20000.00	-3.787879	20	PASS
			NV	40	-20000.00	-3.787879	20	PASS
			NV	50	-20000.00	-3.787879	20	PASS
			NV	60	-20000.00	-3.787879	20	PASS
			NV	70	-20000.00	-3.787879	20	PASS
	Ant1	5320	NV	0	-20000.00	-3.759398	20	PASS
			NV	10	-40000.00	-7.518797	20	PASS
			NV	20	-40000.00	-7.518797	20	PASS
			NV	30	-20000.00	-3.759398	20	PASS
			NV	40	-40000.00	-7.518797	20	PASS
			NV	50	-20000.00	-3.759398	20	PASS
			NV	60	-40000.00	-7.518797	20	PASS
			NV	70	-40000.00	-7.518797	20	PASS
	Ant2	5320	NV	0	-40000.00	-7.518797	20	PASS
			NV	10	-20000.00	-3.759398	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	-40000.00	-7.518797	20	PASS
			NV	60	-40000.00	-7.518797	20	PASS
			NV	70	-40000.00	-7.518797	20	PASS
	Ant1	5500	NV	0	-40000.00	-7.272727	20	PASS
			NV	10	-40000.00	-7.272727	20	PASS
			NV	20	-40000.00	-7.272727	20	PASS
			NV	30	-20000.00	-3.636364	20	PASS
			NV	40	-20000.00	-3.636364	20	PASS
			NV	50	-40000.00	-7.272727	20	PASS
			NV	60	-40000.00	-7.272727	20	PASS
			NV	70	-20000.00	-3.636364	20	PASS
	Ant2	5500	NV	0	-20000.00	-3.636364	20	PASS
			NV	10	-20000.00	-3.636364	20	PASS
			NV	20	-20000.00	-3.636364	20	PASS
			NV	30	-20000.00	-3.636364	20	PASS
			NV	40	-20000.00	-3.636364	20	PASS
			NV	50	-20000.00	-3.636364	20	PASS
			NV	60	-20000.00	-3.636364	20	PASS
			NV	70	-20000.00	-3.636364	20	PASS
	Ant1	5580	NV	0	-20000.00	-3.584229	20	PASS
			NV	10	-20000.00	-3.584229	20	PASS
			NV	20	-20000.00	-3.584229	20	PASS
			NV	30	-40000.00	-7.168459	20	PASS
			NV	40	-20000.00	-3.584229	20	PASS
			NV	50	-20000.00	-3.584229	20	PASS
			NV	60	-40000.00	-7.168459	20	PASS
			NV	70	-20000.00	-3.584229	20	PASS
	Ant2	5580	NV	0	-20000.00	-3.584229	20	PASS
			NV	10	-20000.00	-3.584229	20	PASS
			NV	20	-40000.00	-7.168459	20	PASS
			NV	30	-20000.00	-3.584229	20	PASS
			NV	40	-20000.00	-3.584229	20	PASS
			NV	50	-20000.00	-3.584229	20	PASS
			NV	60	-20000.00	-3.584229	20	PASS
			NV	70	-20000.00	-3.584229	20	PASS
	Ant1	5700	NV	0	-40000.00	-7.017544	20	PASS
			NV	10	-20000.00	-3.508772	20	PASS

			NV	20	-40000.00	-7.017544	20	PASS
			NV	30	-40000.00	-7.017544	20	PASS
			NV	40	-20000.00	-3.508772	20	PASS
			NV	50	-20000.00	-3.508772	20	PASS
			NV	60	-20000.00	-3.508772	20	PASS
			NV	70	-40000.00	-7.017544	20	PASS
	Ant2	5700	NV	0	-20000.00	-3.508772	20	PASS
			NV	10	-20000.00	-3.508772	20	PASS
			NV	20	-40000.00	-7.017544	20	PASS
			NV	30	-40000.00	-7.017544	20	PASS
			NV	40	-40000.00	-7.017544	20	PASS
			NV	50	-40000.00	-7.017544	20	PASS
			NV	60	-40000.00	-7.017544	20	PASS
			NV	70	-40000.00	-7.017544	20	PASS
	Ant1	5720	NV	0	-60000.00	-10.489510	20	PASS
			NV	10	-40000.00	-6.993007	20	PASS
			NV	20	-40000.00	-6.993007	20	PASS
			NV	30	-40000.00	-6.993007	20	PASS
			NV	40	-40000.00	-6.993007	20	PASS
			NV	50	-40000.00	-6.993007	20	PASS
			NV	60	-40000.00	-6.993007	20	PASS
			NV	70	-40000.00	-6.993007	20	PASS
	Ant2	5720	NV	0	-40000.00	-6.993007	20	PASS
			NV	10	-40000.00	-6.993007	20	PASS
			NV	20	-20000.00	-3.496503	20	PASS
			NV	30	-40000.00	-6.993007	20	PASS
			NV	40	-40000.00	-6.993007	20	PASS
			NV	50	-40000.00	-6.993007	20	PASS
			NV	60	-20000.00	-3.496503	20	PASS
			NV	70	-20000.00	-3.496503	20	PASS
	Ant1	5745	NV	0	-40000.00	-6.962576	20	PASS
			NV	10	-60000.00	-10.443864	20	PASS
			NV	20	-40000.00	-6.962576	20	PASS
			NV	30	-20000.00	-3.481288	20	PASS
			NV	40	-60000.00	-10.443864	20	PASS
			NV	50	-40000.00	-6.962576	20	PASS
			NV	60	-40000.00	-6.962576	20	PASS
			NV	70	-40000.00	-6.962576	20	PASS
	Ant2	5745	NV	0	-20000.00	-3.481288	20	PASS
			NV	10	-20000.00	-3.481288	20	PASS
			NV	20	-20000.00	-3.481288	20	PASS
			NV	30	-20000.00	-3.481288	20	PASS
			NV	40	-20000.00	-3.481288	20	PASS
			NV	50	-20000.00	-3.481288	20	PASS
			NV	60	-20000.00	-3.481288	20	PASS
			NV	70	-40000.00	-6.962576	20	PASS
	Ant1	5785	NV	0	-20000.00	-3.457217	20	PASS
			NV	10	-20000.00	-3.457217	20	PASS
			NV	20	-20000.00	-3.457217	20	PASS
			NV	30	-20000.00	-3.457217	20	PASS
			NV	40	-20000.00	-3.457217	20	PASS
			NV	50	-40000.00	-6.914434	20	PASS
			NV	60	-20000.00	-3.457217	20	PASS
			NV	70	-40000.00	-6.914434	20	PASS
	Ant2	5785	NV	0	-40000.00	-6.914434	20	PASS
			NV	10	-20000.00	-3.457217	20	PASS
			NV	20	-40000.00	-6.914434	20	PASS
			NV	30	-20000.00	-3.457217	20	PASS
			NV	40	-40000.00	-6.914434	20	PASS
			NV	50	-20000.00	-3.457217	20	PASS
			NV	60	-20000.00	-3.457217	20	PASS
			NV	70	-20000.00	-3.457217	20	PASS
	Ant1	5825	NV	0	-40000.00	-6.866953	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	-40000.00	-6.866953	20	PASS
			NV	50	-40000.00	-6.866953	20	PASS
			NV	60	-40000.00	-6.866953	20	PASS
			NV	70	-20000.00	-3.433476	20	PASS
			NV	0	-20000.00	-3.433476	20	PASS
	Ant2	5825	NV	10	-20000.00	-3.433476	20	PASS
			NV	20	-20000.00	-3.433476	20	PASS
			NV	30	-20000.00	-3.433476	20	PASS
			NV	40	-20000.00	-3.433476	20	PASS
			NV	50	-20000.00	-3.433476	20	PASS
			NV	60	-20000.00	-3.433476	20	PASS
			NV	70	-20000.00	-3.433476	20	PASS
11N40MIMO	Ant1	5190	NV	0	-40000.00	-7.707129	20	PASS
			NV	10	0.00	0.000000	20	PASS
			NV	20	-40000.00	-7.707129	20	PASS
			NV	30	-40000.00	-7.707129	20	PASS
			NV	40	-40000.00	-7.707129	20	PASS
			NV	50	0.00	0.000000	20	PASS
			NV	60	-40000.00	-7.707129	20	PASS
			NV	70	-40000.00	-7.707129	20	PASS
	Ant2	5190	NV	0	0.00	0.000000	20	PASS
			NV	10	0.00	0.000000	20	PASS
			NV	20	0.00	0.000000	20	PASS
			NV	30	0.00	0.000000	20	PASS
			NV	40	0.00	0.000000	20	PASS
			NV	50	0.00	0.000000	20	PASS
			NV	60	0.00	0.000000	20	PASS
			NV	70	0.00	0.000000	20	PASS
	Ant1	5230	NV	0	0.00	0.000000	20	PASS
			NV	10	0.00	0.000000	20	PASS
			NV	20	0.00	0.000000	20	PASS
			NV	30	0.00	0.000000	20	PASS
			NV	40	0.00	0.000000	20	PASS
			NV	50	0.00	0.000000	20	PASS
			NV	60	0.00	0.000000	20	PASS
			NV	70	0.00	0.000000	20	PASS
	Ant2	5230	NV	0	0.00	0.000000	20	PASS
			NV	10	0.00	0.000000	20	PASS
			NV	20	0.00	0.000000	20	PASS
			NV	30	0.00	0.000000	20	PASS
			NV	40	0.00	0.000000	20	PASS
			NV	50	0.00	0.000000	20	PASS
			NV	60	0.00	0.000000	20	PASS
			NV	70	0.00	0.000000	20	PASS
	Ant1	5270	NV	0	0.00	0.000000	20	PASS
			NV	10	0.00	0.000000	20	PASS
			NV	20	0.00	0.000000	20	PASS
			NV	30	0.00	0.000000	20	PASS
			NV	40	0.00	0.000000	20	PASS
			NV	50	0.00	0.000000	20	PASS
			NV	60	0.00	0.000000	20	PASS
			NV	70	0.00	0.000000	20	PASS
	Ant2	5270	NV	0	0.00	0.000000	20	PASS
			NV	10	0.00	0.000000	20	PASS
			NV	20	0.00	0.000000	20	PASS
			NV	30	0.00	0.000000	20	PASS
			NV	40	0.00	0.000000	20	PASS
			NV	50	0.00	0.000000	20	PASS
			NV	60	0.00	0.000000	20	PASS
			NV	70	0.00	0.000000	20	PASS
	Ant1	5310	NV	0	0.00	0.000000	20	PASS
			NV	10	0.00	0.000000	20	PASS

			NV	20	0.00	0.000000	20	PASS
			NV	30	0.00	0.000000	20	PASS
			NV	40	0.00	0.000000	20	PASS
			NV	50	0.00	0.000000	20	PASS
			NV	60	0.00	0.000000	20	PASS
			NV	70	0.00	0.000000	20	PASS
	Ant2	5310	NV	0	-40000.00	-7.532957	20	PASS
			NV	10	-40000.00	-7.532957	20	PASS
			NV	20	0.00	0.000000	20	PASS
			NV	30	0.00	0.000000	20	PASS
			NV	40	0.00	0.000000	20	PASS
			NV	50	0.00	0.000000	20	PASS
			NV	60	0.00	0.000000	20	PASS
			NV	70	0.00	0.000000	20	PASS
	Ant1	5510	NV	0	0.00	0.000000	20	PASS
			NV	10	0.00	0.000000	20	PASS
			NV	20	0.00	0.000000	20	PASS
			NV	30	0.00	0.000000	20	PASS
			NV	40	0.00	0.000000	20	PASS
			NV	50	0.00	0.000000	20	PASS
			NV	60	0.00	0.000000	20	PASS
			NV	70	0.00	0.000000	20	PASS
	Ant2	5510	NV	0	0.00	0.000000	20	PASS
			NV	10	0.00	0.000000	20	PASS
			NV	20	-40000.00	-7.259528	20	PASS
			NV	30	0.00	0.000000	20	PASS
			NV	40	-40000.00	-7.259528	20	PASS
			NV	50	-40000.00	-7.259528	20	PASS
			NV	60	0.00	0.000000	20	PASS
			NV	70	0.00	0.000000	20	PASS
	Ant1	5550	NV	0	0.00	0.000000	20	PASS
			NV	10	0.00	0.000000	20	PASS
			NV	20	0.00	0.000000	20	PASS
			NV	30	0.00	0.000000	20	PASS
			NV	40	0.00	0.000000	20	PASS
			NV	50	0.00	0.000000	20	PASS
			NV	60	0.00	0.000000	20	PASS
			NV	70	0.00	0.000000	20	PASS
	Ant2	5550	NV	0	0.00	0.000000	20	PASS
			NV	10	0.00	0.000000	20	PASS
			NV	20	0.00	0.000000	20	PASS
			NV	30	0.00	0.000000	20	PASS
			NV	40	0.00	0.000000	20	PASS
			NV	50	0.00	0.000000	20	PASS
			NV	60	0.00	0.000000	20	PASS
			NV	70	0.00	0.000000	20	PASS
	Ant1	5670	NV	0	-40000.00	-7.054674	20	PASS
			NV	10	-40000.00	-7.054674	20	PASS
			NV	20	0.00	0.000000	20	PASS
			NV	30	-40000.00	-7.054674	20	PASS
			NV	40	0.00	0.000000	20	PASS
			NV	50	-40000.00	-7.054674	20	PASS
			NV	60	0.00	0.000000	20	PASS
			NV	70	-40000.00	-7.054674	20	PASS
	Ant2	5670	NV	0	0.00	0.000000	20	PASS
			NV	10	0.00	0.000000	20	PASS
			NV	20	0.00	0.000000	20	PASS
			NV	30	0.00	0.000000	20	PASS
			NV	40	0.00	0.000000	20	PASS
			NV	50	0.00	0.000000	20	PASS
			NV	60	0.00	0.000000	20	PASS
			NV	70	0.00	0.000000	20	PASS
	Ant1	5710	NV	0	-40000.00	-7.005254	20	PASS
			NV	10	0.00	0.000000	20	PASS

11AC80MIMO			NV	20	0.00	0.000000	20	PASS
			NV	30	-40000.00	-7.005254	20	PASS
			NV	40	-40000.00	-7.005254	20	PASS
			NV	50	-40000.00	-7.005254	20	PASS
			NV	60	-40000.00	-7.005254	20	PASS
			NV	70	-40000.00	-7.005254	20	PASS
	Ant2	5710	NV	0	0.00	0.000000	20	PASS
			NV	10	0.00	0.000000	20	PASS
			NV	20	0.00	0.000000	20	PASS
			NV	30	0.00	0.000000	20	PASS
			NV	40	0.00	0.000000	20	PASS
			NV	50	0.00	0.000000	20	PASS
	Ant1	5755	NV	60	0.00	0.000000	20	PASS
			NV	70	0.00	0.000000	20	PASS
			NV	0	0.00	0.000000	20	PASS
			NV	10	0.00	0.000000	20	PASS
			NV	20	0.00	0.000000	20	PASS
			NV	30	0.00	0.000000	20	PASS
	Ant2	5755	NV	40	0.00	0.000000	20	PASS
			NV	50	0.00	0.000000	20	PASS
			NV	60	0.00	0.000000	20	PASS
			NV	70	0.00	0.000000	20	PASS
			NV	0	-40000.00	-6.950478	20	PASS
			NV	10	0.00	0.000000	20	PASS
	Ant1	5795	NV	20	0.00	0.000000	20	PASS
			NV	30	0.00	0.000000	20	PASS
			NV	40	-40000.00	-6.902502	20	PASS
			NV	50	-40000.00	-6.902502	20	PASS
			NV	60	0.00	0.000000	20	PASS
			NV	70	0.00	0.000000	20	PASS
	Ant2	5795	NV	0	-40000.00	-6.902502	20	PASS
			NV	10	-40000.00	-6.902502	20	PASS
			NV	20	-40000.00	-6.902502	20	PASS
			NV	30	-40000.00	-6.902502	20	PASS
			NV	40	0.00	0.000000	20	PASS
			NV	50	-40000.00	-6.902502	20	PASS
11AC80MIMO	Ant1	5210	NV	60	-40000.00	-6.902502	20	PASS
			NV	70	-40000.00	-6.902502	20	PASS
			NV	0	0.00	0.000000	20	PASS
			NV	10	-40000.00	-6.902502	20	PASS
			NV	20	-40000.00	-6.902502	20	PASS
			NV	30	0.00	0.000000	20	PASS
	Ant2	5210	NV	40	-40000.00	-6.902502	20	PASS
			NV	50	-40000.00	-6.902502	20	PASS
			NV	60	0.00	0.000000	20	PASS
			NV	70	-40000.00	-6.902502	20	PASS
			NV	0	-40000.00	-6.902502	20	PASS
			NV	10	-40000.00	-6.902502	20	PASS
	Ant1	5290	NV	20	-40000.00	-6.902502	20	PASS
			NV	30	-40000.00	-6.902502	20	PASS
			NV	40	0.00	0.000000	20	PASS
			NV	50	0.00	0.000000	20	PASS
			NV	60	0.00	0.000000	20	PASS
			NV	70	0.00	0.000000	20	PASS
			NV	0	0.00	0.000000	20	PASS
			NV	10	0.00	0.000000	20	PASS

			NV	20	0.00	0.000000	20	PASS
			NV	30	0.00	0.000000	20	PASS
			NV	40	80000.00	15.122873	20	PASS
			NV	50	0.00	0.000000	20	PASS
			NV	60	80000.00	15.122873	20	PASS
			NV	70	0.00	0.000000	20	PASS
	Ant2	5290	NV	0	80000.00	15.122873	20	PASS
			NV	10	-80000.00	-15.122873	20	PASS
			NV	20	80000.00	15.122873	20	PASS
			NV	30	80000.00	15.122873	20	PASS
			NV	40	80000.00	15.122873	20	PASS
			NV	50	-80000.00	-15.122873	20	PASS
			NV	60	80000.00	15.122873	20	PASS
			NV	70	80000.00	15.122873	20	PASS
			NV	0	0.00	0.000000	20	PASS
			NV	10	0.00	0.000000	20	PASS
			NV	20	0.00	0.000000	20	PASS
			NV	30	0.00	0.000000	20	PASS
			NV	40	0.00	0.000000	20	PASS
			NV	50	0.00	0.000000	20	PASS
	Ant1	5530	NV	60	0.00	0.000000	20	PASS
			NV	70	-80000.00	-14.466546	20	PASS
			NV	0	80000.00	15.122873	20	PASS
			NV	10	80000.00	15.122873	20	PASS
			NV	20	80000.00	15.122873	20	PASS
			NV	30	80000.00	15.122873	20	PASS
	Ant2	5530	NV	40	80000.00	15.122873	20	PASS
			NV	50	80000.00	15.122873	20	PASS
			NV	60	0.00	0.000000	20	PASS
			NV	70	0.00	0.000000	20	PASS
			NV	0	80000.00	14.260250	20	PASS
			NV	10	0.00	0.000000	20	PASS
	Ant1	5610	NV	20	0.00	0.000000	20	PASS
			NV	30	0.00	0.000000	20	PASS
			NV	40	80000.00	14.260250	20	PASS
			NV	50	-80000.00	-14.260250	20	PASS
			NV	60	0.00	0.000000	20	PASS
			NV	70	0.00	0.000000	20	PASS
	Ant2	5610	NV	0	0.00	0.000000	20	PASS
			NV	10	80000.00	14.260250	20	PASS
			NV	20	80000.00	14.260250	20	PASS
			NV	30	80000.00	14.260250	20	PASS
			NV	40	80000.00	14.260250	20	PASS
			NV	50	80000.00	14.260250	20	PASS
			NV	60	-80000.00	-14.260250	20	PASS
			NV	70	-80000.00	-14.260250	20	PASS
			NV	0	-80000.00	-14.059754	20	PASS
			NV	10	-80000.00	-14.260250	20	PASS
	Ant1	5690	NV	20	-80000.00	-14.059754	20	PASS
			NV	30	-80000.00	-14.260250	20	PASS
			NV	40	-80000.00	-14.260250	20	PASS
			NV	50	0.00	0.000000	20	PASS
			NV	60	0.00	0.000000	20	PASS
			NV	70	0.00	0.000000	20	PASS
			NV	0	0.00	0.000000	20	PASS
			NV	10	0.00	0.000000	20	PASS
			NV	20	0.00	0.000000	20	PASS
			NV	30	0.00	0.000000	20	PASS
	Ant2	5690	NV	40	-80000.00	-14.260250	20	PASS
			NV	50	-80000.00	-14.260250	20	PASS
			NV	60	80000.00	14.059754	20	PASS
			NV	70	-80000.00	-14.260250	20	PASS
			NV	0	-80000.00	-13.852814	20	PASS
			NV	10	0.00	0.000000	20	PASS

			NV	20	0.00	0.000000	20	PASS
			NV	30	-80000.00	-13.852814	20	PASS
			NV	40	-80000.00	-14.260250	20	PASS
			NV	50	80000.00	13.852814	20	PASS
			NV	60	0.00	0.000000	20	PASS
			NV	70	0.00	0.000000	20	PASS
			NV	0	-80000.00	-14.260250	20	PASS
	Ant2	5775	NV	10	-80000.00	-14.260250	20	PASS
			NV	20	80000.00	13.852814	20	PASS
			NV	30	80000.00	13.852814	20	PASS
			NV	40	80000.00	13.852814	20	PASS
			NV	50	-80000.00	-14.260250	20	PASS
			NV	60	0.00	0.000000	20	PASS
			NV	70	-80000.00	-14.260250	20	PASS

11. Dynamic Frequency Selection

11.1. Applicability of DFS requirements

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.

11.2. 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.

11.3. Parameters of radar test waveforms

This section provides the parameters for required test waveforms, minimum percentage of successful detections, 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 $\left\{ \left(\frac{1}{360} \right) \cdot \left(\frac{19 \cdot 10^6}{\text{PRI}_{\mu\text{sec}}} \right) \right\}$	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					

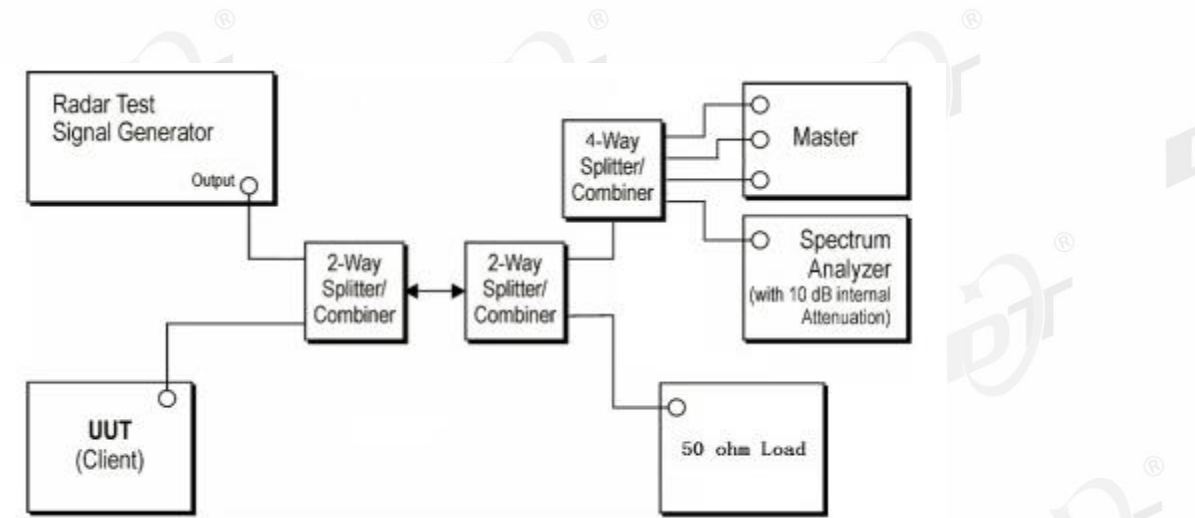
A minimum of 30 unique waveforms are required for each of the Short Pulse Radar Types 2 through 4. If more than 30 waveforms are used for Short Pulse Radar Types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. If more than 30 waveforms are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

11.4. Calibration of radar waveform

Radar Waveform Calibration Procedure:

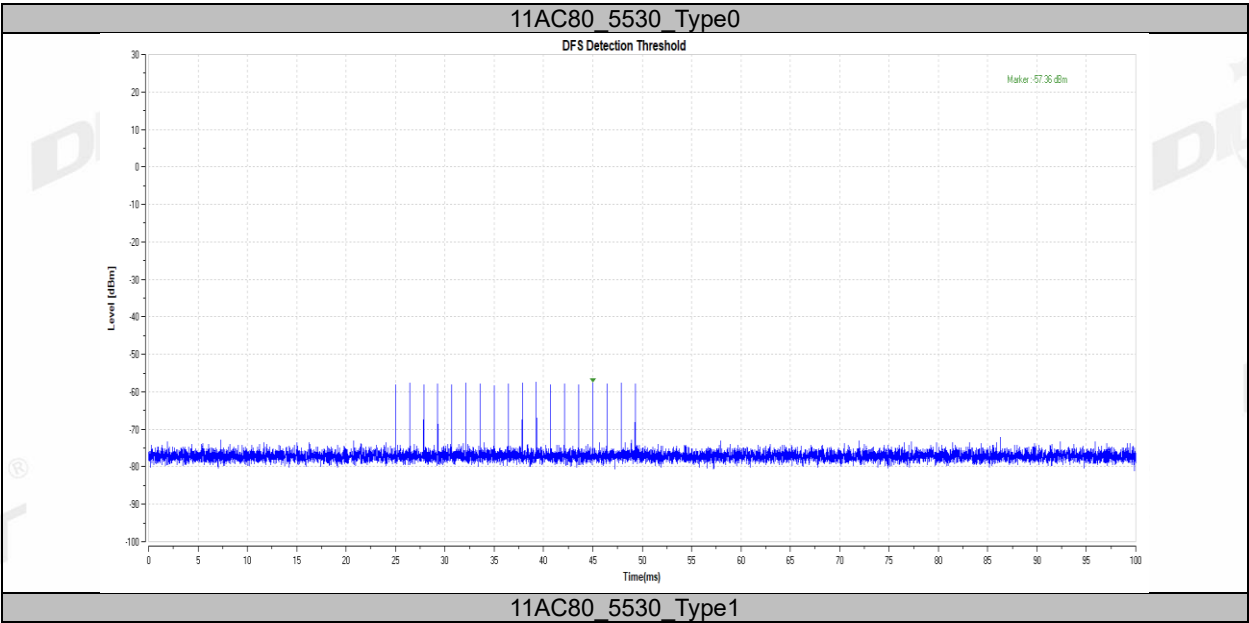
- (1) A 50 ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to place of the master
- (2) The interference Radar Detection Threshold Level is $-62\text{dBm} + 0\text{dBi} + 1\text{dB} = -61\text{dBm}$ that had been taken into account the output power range and antenna gain.
- (3) 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.
- (4) The vector signal generator amplitude was set so that the power level measured at the spectrum analyzer was $-62\text{dBm} + 4.66\text{dBi} + 1\text{dB} = -56.34\text{dBm}$. Capture the spectrum analyzer plots on short pulse radar waveform.

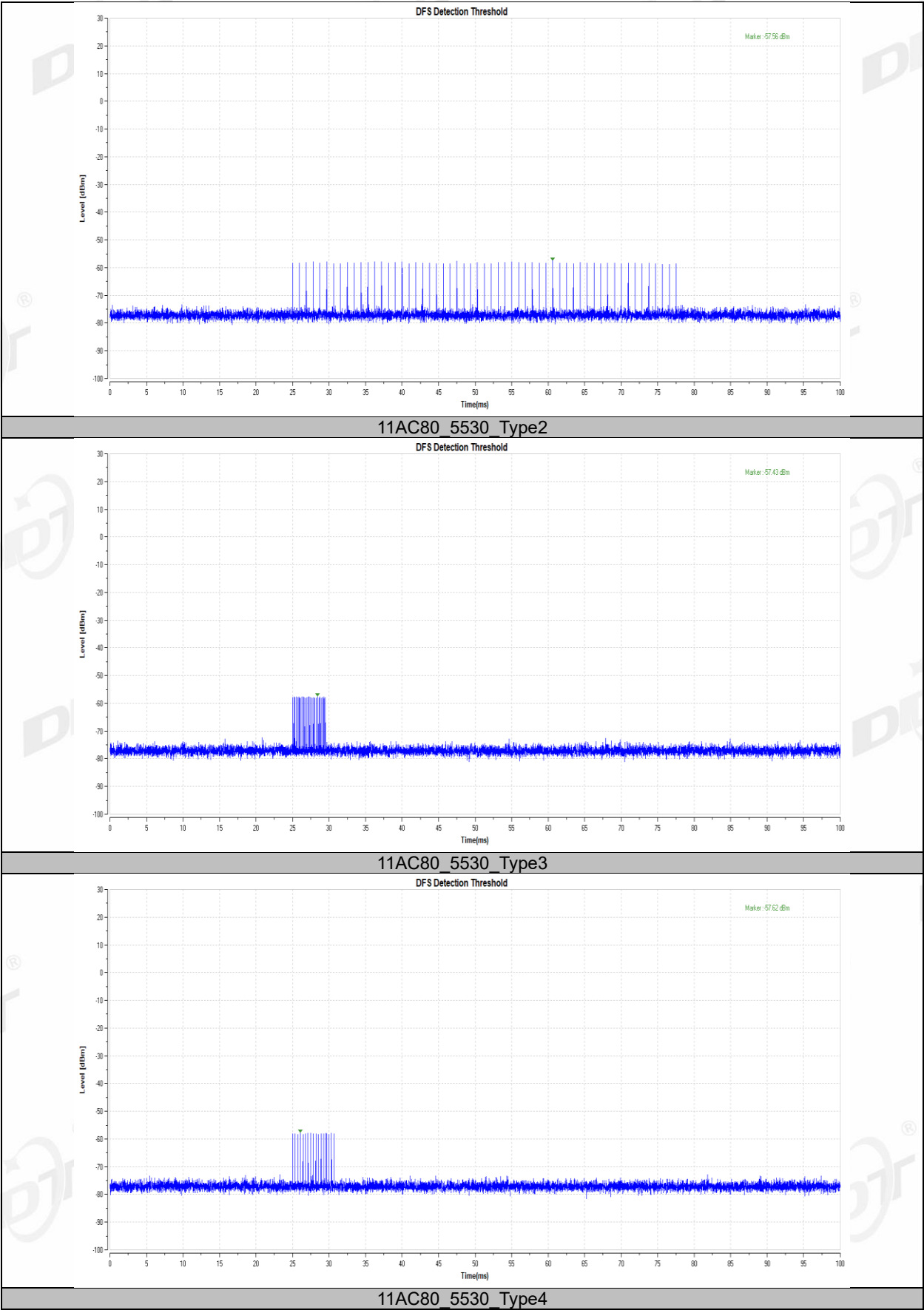
Conducted Calibration Setup:

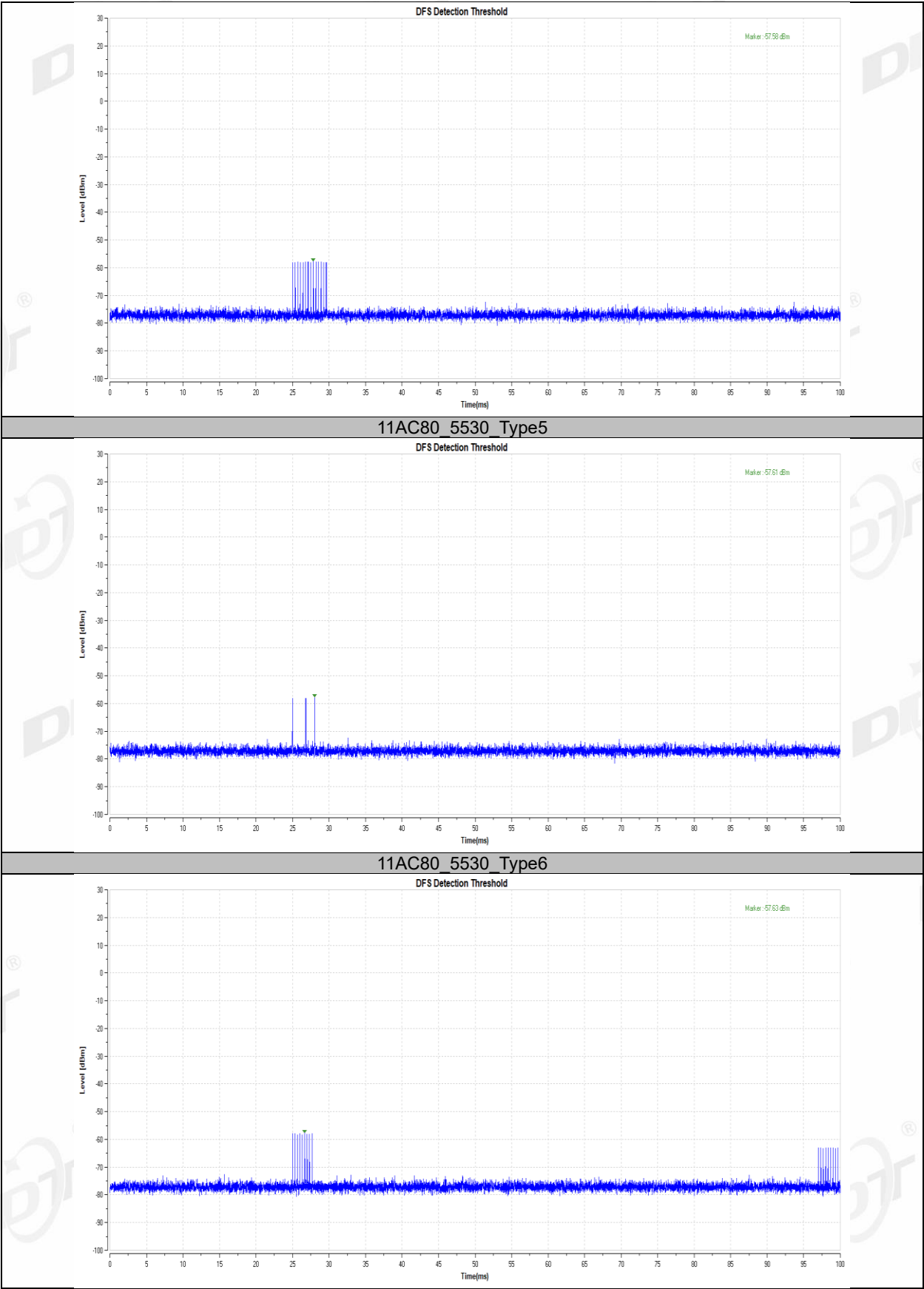


Note: 1. Use the software "Web" to set the frequency channel.
2. EUT is not support TPC and not with Radar detection.

TestMode	Frequency[dbm]	Radar Type	Result	Limit[dbm]	Verdict
11AC80	5530	Type0	-57.36	-57.34	PASS
		Type1	-57.56	-57.34	PASS
		Type2	-57.43	-57.34	PASS
		Type3	-57.62	-57.34	PASS
		Type4	-57.58	-57.34	PASS
		Type5	-57.61	-57.34	PASS
		Type6	-57.63	-57.34	PASS







11.5. Channel closing transmission time, channel move time and non-occupancy period

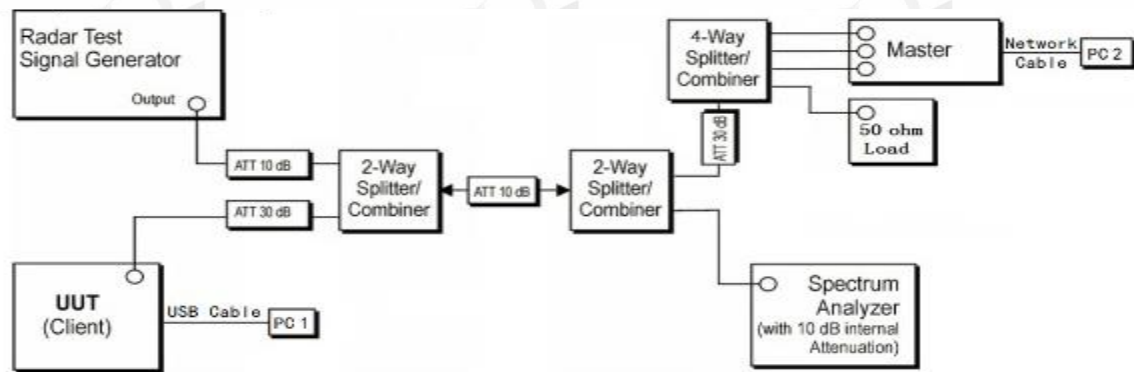
Block diagram of test setup Test Procedure:

- (1) 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.
- (2) 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.
- (3) 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.
- (4) 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.
- (5) 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.
- (6) 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.
- (7) Measurement of the aggregate duration of the Channel Closed Transmission Time method. With the
- (8) 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.

11.6. Test setup

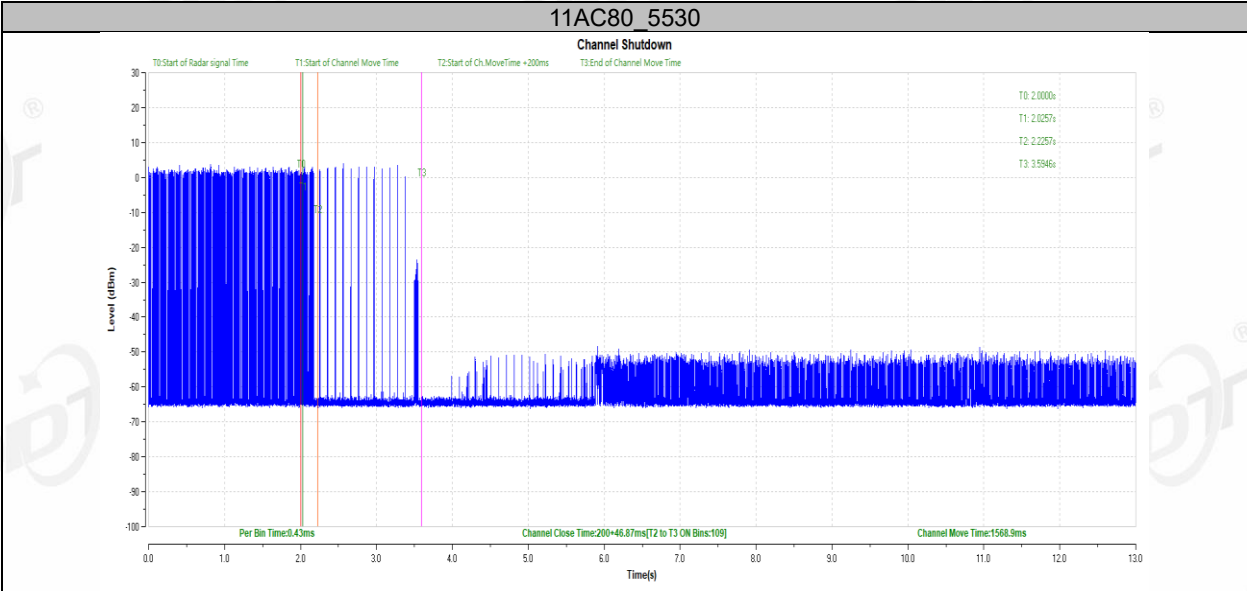
Setup for Client with injection at the Master



11.7. Test result

Test Engineer:	Zhongyao	Test Site:	RF Measurement System 3#
Ambient Condition:	26.1℃,38.6%RH	Test Date:	2024.07.07-2024.07.30
Test Power Supply:	DC 12V	Sample Number:	S24062520-003

TestMode	Frequency[MHz]	CCTT[ms]	Limit[ms]	CMT[ms]	Limit[ms]	Verdict
11AC80	5530	200+46.87	200+60	1568.9	10000	PASS



12. Antenna Requirements

12.1. Limit

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

12.2. Result

The antenna used for this product as Antenna information described in section 2.1 of the report, and there is no other antenna than that furnished by the responsible party shall be used with the device.