TEST REPORT

Report No.	CISRR24082921506
Project No.	CISR240829215
FCC ID	2BE3U-X1
Applicant	CND Electronic Technology (shenzhen) Co.,Ltd
Address	5th Floor,(A)CD,XingHua Building No.7,Naihai Road, Nanshan District, Shenzhen, China
Manufacturer	CND Electronic Technology (shenzhen) Co.,Ltd
Address	5th Floor,(A)CD,XingHua Building No.7,Naihai Road, Nanshan District, Shenzhen, China
Product Name	Bonding Encoder
Trade Mark	CND LIVE
Model/Type reference	X1
Listed Model(s)	X3, X10, X1 Plus
Standard	Part 15 Subpart E Section 15.407
Test date	August 29, 2024 ~ November 15, 2024
Issue date	November 15, 2024
Test result	**Complied**

Rory Huang

Prepared by: Rory Huang

Genry Long

Approved by: Genry Long

The test results relate only to the tested samples.

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Contents

1. REPORT VERSION

Version No.	Issue date	Description
00	November 15, 2024	Original

2. SUMMARY OF TEST RESULT

No.	Test Item	Standard Requirement	Result
1	Non-Occupancy Period	FCC Part 15.407	Not required
2	DFS Detection Threshold	FCC Part 15.407	Not required
3	Channel Availability Check Time	FCC Part 15.407	Not required
4	Channel Closing Transmission Time	FCC Part 15.407	PASS
5	Channel Move Time	FCC Part 15.407	PASS
6	U-NII Detection Bandwidth	FCC Part 15.407	Not required
7	Statistical Performance Check	FCC Part 15.407	Not required

Note:

– The measurement uncertainty is not included in the test result.

– client device without radar detection capability.

3. SUMMARY

3.1. Product Description

Main unit information:	
Product Name:	Bonding Encoder
Trade Mark:	CND LIVE
Model No.:	X1
Listed Model(s):	X3, X10, X1 Plus
Power supply:	Adapter Input: AC 100-240V, 50/60Hz, 0.8A Adapter Output: 5V⎓ 3A , 9V⎓ 3A,12V⎓ 2.5A, 20V⎓ 1.5A EUT Input: DC 5V DC 7.2V for Battery
Hardware version:	912A
Software version:	912A

3.2. Radio Specification Description

Technology:	802.11a/n/ac(HT20), 802.11n/ac(HT40), 802.11ac(HT80)
Modulation:	802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK) 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)
Operation frequency:	5745MHz~5825MHz
Channel number:	5 channels for 20MHz bandwidth(5745MHz~5825MHz) 2 channels for 40MHz bandwidth(5755MHz~5795MHz) 1 channels for 80MHz bandwidth(5775MHz)
Channel separation:	5MHz
Antenna type:	FPC Antenna
Antenna gain:	1.4dBi

3.3. Modification of EUT

No modifications are made to the EUT during all test items.

3.4. Testing Site

Laboratory Name	Shenzhen Bangce Testing Technology Co., Ltd.
Laboratory Location	101, building 10, Yunli Intelligent Park, Shutianpu community, Matian Street, Guangming District, Shenzhen, Guangdong, China
FCC registration number	736346

3.5. Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS (dBuV/m) = RA (dBuV) + AF (dB/m) + CL (dB) – AG (dB)

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

3.6. DISTURBANCE Calculation

The AC mains conducted disturbance is calculated by adding the 10dB Pulse Limiter and Cable Factor and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

CD (dBuV) = RA (dBuV) + PL (dB) + CL (dB)

Where CD = Conducted Disturbance	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	PL = 10 dB Pulse Limiter Factor

4. TEST CONFIGURATION

This report has been prepared to demonstrate compliance with the requirements for Dynamic Frequency Selection (DFS) as stated in FCC CFR 47 PART 15E(15.407). Testing was performed in accordance with the measurement procedure described in FCC KDB 905462 D02 v02

4.1. Test frequency list

U-NI-2A

Frequency Band	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
5250-5350MHz	50	5250	58	5290
	52	5260	60	5300
	54	5270	62	5310
	56	5280	64	5320

U-NI-2C

Frequency Band	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
5470-5725MHz	100	5500	118	5590
	102	5510	120	5600
	104	5520	122	5610
	106	5530	124	5620
	108	5540	126	5630
	110	5550	128	5640
	112	5560	132	5660
	114	5570	134	5670
	116	5580	136	5680
	--	--	140	5700

4.2. Test mode

For RF test items:		
The engineering test program was provided(QPST_2.7.496) and enabled to make EUT continuous transmitting.Power setting Default.		
Test Item	Test Mode	Modulation
Conducted test item	TX CH-L	802.11a/n/ac(HT20),802.11n/ac(HT40), 802.11ac(HT80)
	TX CH-M	802.11a/n/ac(HT20),802.11n/ac(HT40), 802.11ac(HT80)
	TX CH-H	802.11a/n/ac(HT20),802.11n/ac(HT40), 802.11ac(HT80)
Remark: – All patterns have predictions, and the report only shows the worst pattern data.		

4.3. Support unit used in test configuration and system

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following peripheral devices and interface cables were connected during the measurement:

Item	Equipment name	Trade Name	Model No.	FCC ID
1	Router	ASUS	GT-BE98 Pro	MSQ-RTBE6M00
2	Adapter	SHENZHEN PUSHIDA ELECTRONIC TECHNOLOGYCO.LTD	--	--

4.4. Test sample information

Type	sample no.
Engineer sample	CISR240829215-S01
Normal sample	CISR240829215-S02

4.5. Testing environmental condition

Type	Requirement	Actual
Temperature:	15~35°C	25°C
Relative Humidity:	25~75%	50%
Air Pressure:	860~1060mbar	1000mbar

4.6. Statement of the measurement uncertainty

No.	Test Items	Measurement Uncertainty
1	DFS Threshold (radiated)	1.68dB
2	DFS Threshold (conducted)	1.74dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

4.7. Conduted Output Power and EIRP

ANT1:

Mode	Frequency Band (MHz)	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)	Maximum EIRP (dBm)	Maximum EIRP (mW)
IEEE 802.11a	5260 – 5320	8.642	-4.15	4.49	2.81
	5500 – 5700	9.016	-4.15	4.87	3.07
IEEE 802.11n HT20	5260 – 5320	8.267	-4.15	4.12	2.58
	5500 – 5700	8.901	-4.15	4.75	2.99
IEEE 802.11ac VHT20	5260 – 5320	7.500	-4.15	3.35	2.16
	5500 – 5700	8.699	-4.15	4.55	2.85
IEEE 802.11n HT40	5270 – 5310	8.657	-4.15	4.51	2.82
	5510 – 5670	9.190	-4.15	5.04	3.19
IEEE 802.11ac VHT40	5270 – 5310	7.255	-4.15	3.11	2.04
	5510 – 5670	8.349	-4.15	4.20	2.63
IEEE 802.11ac VHT80	5290	6.952	-4.15	2.80	1.91
	5530-5610	7.929	-4.15	3.78	2.39
IEEE 802.11ac VHT160	5570	6.769	-4.15	2.62	1.83

ANT2:

Mode	Frequency Band (MHz)	Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)	Maximum EIRP (dBm)	Maximum EIRP (mW)
IEEE 802.11a	5260 – 5320	7.858	-4.18	3.68	2.33
	5500 – 5700	8.015	-4.18	3.84	2.42
IEEE 802.11n HT20	5260 – 5320	8.327	-4.18	4.15	2.60
	5500 – 5700	8.019	-4.18	3.84	2.42
IEEE 802.11ac VHT20	5260 – 5320	8.526	-4.18	4.35	2.72
	5500 – 5700	8.968	-4.18	4.79	3.01
IEEE 802.11n HT40	5270 – 5310	8.042	-4.18	3.86	2.43
	5510 – 5670	8.194	-4.18	4.01	2.52
IEEE 802.11ac VHT40	5270 – 5310	7.099	-4.18	2.92	1.96
	5510 – 5670	8.023	-4.18	3.84	2.42
IEEE 802.11ac VHT80	5290	6.991	-4.18	2.81	1.91
	5530-5610	8.512	-4.18	4.33	2.71
IEEE 802.11ac VHT160	5570	7.301	-4.18	3.12	2.05

Remark:

1. A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW;

4.8. Equipment Used during the Test

Equipment	Manufacture	Model No.	Serial No.	Last cal.	Cal Interval
9*6*6 anechoic chamber	SKET	9.3*6.3*6	N/A	2024.09.01	3Year
Spectrum analyzer	Agilent	N9020A	MY50530263	2024.01.08	1Year
Receiver	ROHDE&SCHWARZ	ESCI	100853	2024.01.08	1Year
Spectrum analyzer	R&S	FSV-40N	/	2024.01.08	1Year
Bilog Antenna	Schwarzbeck	VULB 9163	1463	2023.01.09	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	2487	2023.01.09	2Year
Active Loop Antenna	SCHWARZBECK	FMZB 1519B	/	2023.01.09	2Year
RF Cable	Tonscend	Cable 1	/	2024.01.08	1Year
RF Cable	Tonscend	Cable 2	/	2024.01.08	1Year
RF Cable	SKET	Cable 3	/	2024.01.08	1Year
Pre-amplifier	Tonscend	TAP9K3G32	AP21G806153	2024.01.08	1Year
Pre-amplifier	Tonscend	TAP01018050	AP22E806229	2024.01.08	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8127	/	2024.01.08	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	/	2024.01.08	1 Year
Horn Antenna	SCHWARZBECK	BBHA9170	1130	2023.01.09	2 Year
Preamplifier	Tonscend	TAP18040048	AP21C806126	2024.01.08	1 Year
variable-frequency power source	Pinhong	PH1110	/	2024.01.08	1 Year
6dB Attenuator	SKET	DC-6G	/	N/A	N/A
Artificial power network	Schwarzbeck	NSLK8127	8127-01096	2024.01.08	1 Year
EMI Test Receiver	Rohde&schwarz	ESCI7	100853	2024.01.08	1 Year
8-wire Impedance Stabilization Network	Schwarzbeck	NTFM 8158	8158-00337	2024.01.08	1 Year
Artificial power network	Schwarzbeck	ENV216	/	2024.01.08	1 Year
Antenna tower	SKET	Bk-4AT-BS	AT2021040101-V1	N/A	N/A

5. TEST CONDITIONS AND RESULTS

5.1 Statistical Performance Check

Test Requirement:

KDB 935210 D02, Clause 5.1 Table 2
Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth.

Test Limit:

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: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a	Roundup $\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot10^6}{\mathrm{PRI}_{\mu sec}}\right)\right\}$	60%	30
		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			
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.

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.

Table 6 – Long Pulse Radar Test Waveform

Radar Type	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Number of Pulses per *Burst*	Number of *Bursts*	Minimum Percentage of Successful Detection	Minimum Number of Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

The parameters for this waveform are randomly chosen. Thirty unique waveforms are required for the Long Pulse Radar Type waveforms. If more than 30 waveforms are used for the Long Pulse Radar Type waveforms, then each additional waveform must also be unique and not repeated from the previous waveforms.

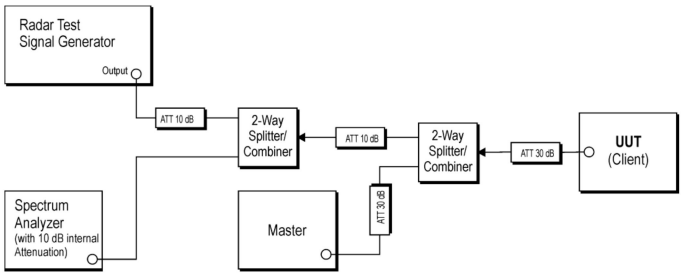
Table 7 – Frequency Hopping Radar Test Waveform

Radar Type	Pulse Width (µsec)	PRI (µsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

For the Frequency Hopping Radar Type, the same Burst parameters are used for each waveform. The hopping sequence is different for each waveform and a 100-length segment is selected from the hopping sequence defined by the following algorithm: 4

	The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250 – 5724 MHz. Next, the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until all 475 frequencies are chosen for the set. For selection of a random frequency, the frequencies remaining within the group are always treated as equally likely.
Test Method:	KDB 935210 D02, Clause 7.8.4
Procedure:	The steps below define the procedure to determine the minimum percentage of successful detection requirements found in **Tables 5-7** when a radar burst with a level equal to the *DFS Detection Threshold* + 1dB is generated on the *Operating Channel* of the U-NII device *(In- Service Monitoring).* 1. One frequency will be chosen from the *Operating Channels* of the UUT within the 5250-5350 MHz or 5470-5725 MHz bands. 2. In case the UUT is a U-NII device operating as a *Client Device* (with or without Radar Detection), a U-NII device operating as a *Master Device* will be used to allow the UUT (Client device) to *Associate* with the *Master Device* . In case the UUT is a *Master Device* , a U-NII device operating as a *Client Device* will be used and it is assumed that the Client will *Associate* with the UUT (Master). In both cases for conducted tests, the *Radar Waveform* generator will be connected to the *Master Device* . For radiated tests, the emissions of the *Radar Waveform* generator will be directed towards the *Master Device* . If the *Master Device* has antenna gain, the main beam of the antenna will be directed toward the radar emitter. Vertical polarization is used for testing. 3. Stream the channel loading test file from the *Master Device* to the Client Device on the test *Channel* for the entire period of the test. 4. At time T0 the *Radar Waveform* generator sends the individual waveform for each of the Radar Types 1- 6 in **Tables 5-7** , at levels defined in **Table 3** , on the *Operating Channel* . An additional 1 dB is added to the radar test signal to ensure it is at or above the *DFS Detection Threshold* , accounting for equipment variations/errors. 5. Observe the transmissions of the UUT at the end of the Burst on the *Operating Channel* for duration greater than 10 seconds for Radar Type 0 to ensure detection occurs. 6. Observe the transmissions of the UUT at the end of the Burst on the *Operating Channel* for duration greater than 22 seconds for Long Pulse Radar Type 5 to ensure detection occurs. 7. In case the UUT is a U-NII device operating as a *Client Device* with *In-Service Monitoring* , perform steps 1 to 6.

Test Setup Diagram



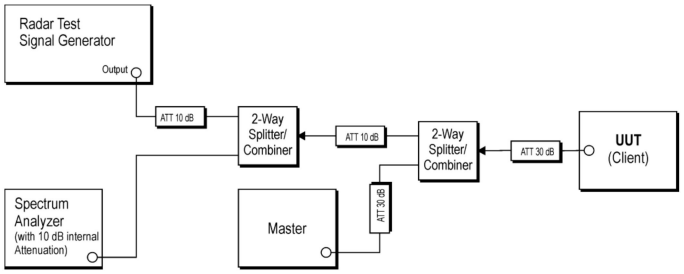
5.2 U-NII Detection Bandwidth

Test Requirement:	47 CFR Part 15.407(h)(2)
Test Limit:	Minimum 100% of the U-NII 99% transmission power bandwidth. 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.
Test Method:	KDB 905462 D02, Clause 7.8.1
Procedure:	1. Adjust the equipment to produce a single *Burst* of any one of the Short Pulse Radar Types 0 – 4 in **Table 5** at the center frequency of the UUT *Operating Channel* at the specified *DFS Detection Threshold* level found in **Table 3** . 2. Set the UUT up as a standalone device (no associated Client or Master, as appropriate) and no traffic. Frame based systems will be set to a talk/listen ratio reflecting the worst case (maximum) that is user configurable during this test. 3. Generate a single radar *Burst* , and note the response of the UUT. Repeat for a minimum of 10 trials. The UUT must detect the *Radar Waveform* within the DFS band using the specified *U-NII Detection Bandwidth* criterion shown in **Table 4** . In cases where the channel bandwidth may exceed past the DFS band edge on specific channels (i.e., 802.11ac or wideband frame based systems) select a channel that has the entire emission bandwidth within the DFS band. If this is not possible, test the detection BW to the DFS band edge. 4. Starting at the center frequency of the UUT operating *Channel* , increase the radar frequency in 5 MHz steps, repeating the above test sequence, until the detection rate falls below the *U-NII Detection Bandwidth* criterion specified in **Table 4** . Repeat this measurement in 1MHz steps at frequencies 5 MHz below where the detection rate begins to fall. Record the highest frequency (denote as F_H) at which detection is greater than or equal to the *U-NII Detection Bandwidth* criterion. Recording the detection rate at frequencies above F_H is not required to demonstrate compliance. 5. Starting at the center frequency of the UUT operating *Channel* , decrease the radar frequency in 5 MHz steps, repeating the above test sequence, until the detection rate falls below the *U-NII Detection Bandwidth* criterion specified in **Table 4** . Repeat this measurement in 1MHz steps at frequencies 5 MHz above where the detection rate begins to fall. Record the lowest frequency (denote as F_L) at which detection is greater than or equal to the *U-NII Detection Bandwidth* criterion. Recording the detection rate at frequencies below F_L is not required to demonstrate compliance. The *U-NII Detection Bandwidth* is calculated as follows: *U-NII Detection Bandwidth* = $F_H - F_L$

E.U.T. Operation

Operating Environment:					
Temperature :	0 °C	Humidity:	0 %	Atmospheric Pressure:	0 kPa
Pre test mode:	Not Applicable				
Final test mode:	Not Applicable				

Test Setup Diagram



Test Data

Not Applicable.

5.3 Channel Move Time, Channel Closing Transmission Time

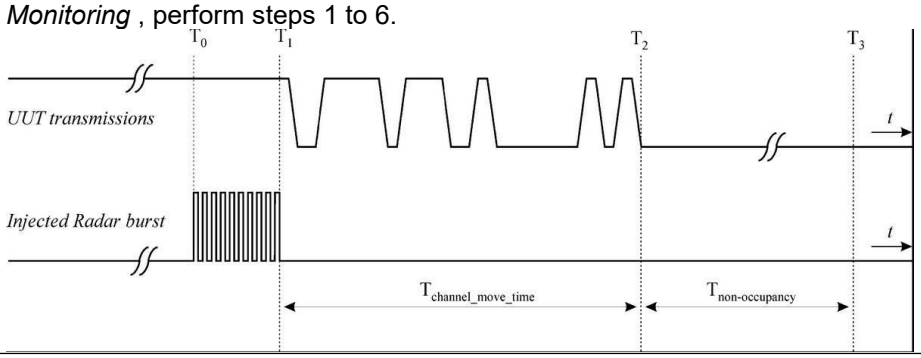
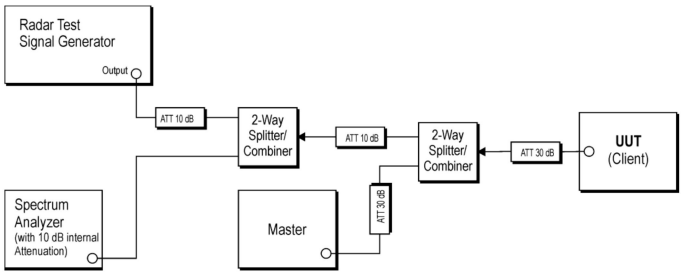
Test Requirement:	47 CFR Part 15.407(h)(2)(iii)
Test Limit:	Channel Move Time: within 10 seconds Channel Closing Transmission Time: 200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. (The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate 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.)
Test Method:	KDB 905462 D02, Clause 7.8.3
Procedure:	The steps below define the procedure to determine the above-mentioned parameters when a radar *Burst* with a level equal to the *DFS Detection Threshold* + 1dB is generated on the *Operating Channel* of the U-NII device *(In- Service Monitoring).* 1. One frequency will be chosen from the *Operating Channels* of the UUT within the 5250-5350 MHz or 5470-5725 MHz bands. For 802.11 devices, the test frequency must contain control signals. This can be verified by disabling channel loading and monitoring the spectrum analyzer. If no control signals are detected, another frequency must be selected within the emission bandwidth where control signals are detected. 2. In case the UUT is a U-NII device operating as a *Client Device* (with or without DFS), a U-NII device operating as a *Master Device* will be used to allow the UUT (Client device) to *Associate* with the *Master Device* . In case the UUT is a *Master Device* , a U-NII device operating as a *Client Device* will be used and it is assumed that the Client will *Associate* with the UUT (Master). In both cases for conducted tests, the *Radar Waveform* generator will be connected to the *Master Device* . For radiated tests, the emissions of the *Radar Waveform* generator will be directed towards the *Master Device* . If the *Master Device* has antenna gain, the main beam of the antenna will be directed toward the radar emitter. Vertical polarization is used for testing. 3. Stream the channel loading test file from the *Master Device* to the *Client Device* on the test *Channel* for the entire period of the test. 4. At time T0 the *Radar Waveform* generator sends a *Burst* of pulses for one of the Radar Type 0 in **Table 5** at levels defined in **Table 3** , on the *Operating Channel* . An additional 1 dB is added to the radar test signal to ensure it is at or above the *DFS Detection Threshold* , accounting for equipment variations/errors. 5. Observe the transmissions of the UUT at the end of the radar *Burst* on the *Operating Channel* for duration greater than 10 seconds. Measure and record the transmissions from the UUT during the observation time (*Channel Move Time)* . Measure and record the *Channel Move Time* and *Channel Closing Transmission Time* if radar detection occurs. **Figure 17** illustrates *Channel Closing Transmission Time.* 6. When operating as a *Master Device* , monitor the UUT for more than 30 minutes following instant T2 to verify that the UUT does not resume any transmissions on this *Channel* . Perform this test once and record the measurement result. 7. In case the UUT is a U-NII device operating as a *Client Device* with *In-Service Monitoring* , perform steps 1 to 6. 

	Figure 17: Example of Channel Closing Transmission Time & Channel Closing Time

E.U.T. Operation

Operating Environment:					
Temperature :	22.3 °C	Humidity:	55.7 %	Atmospheric Pressure:	101.5 kPa
Pre test mode:	TX mode				
Final test mode:	TX mode				

Test Setup Diagram

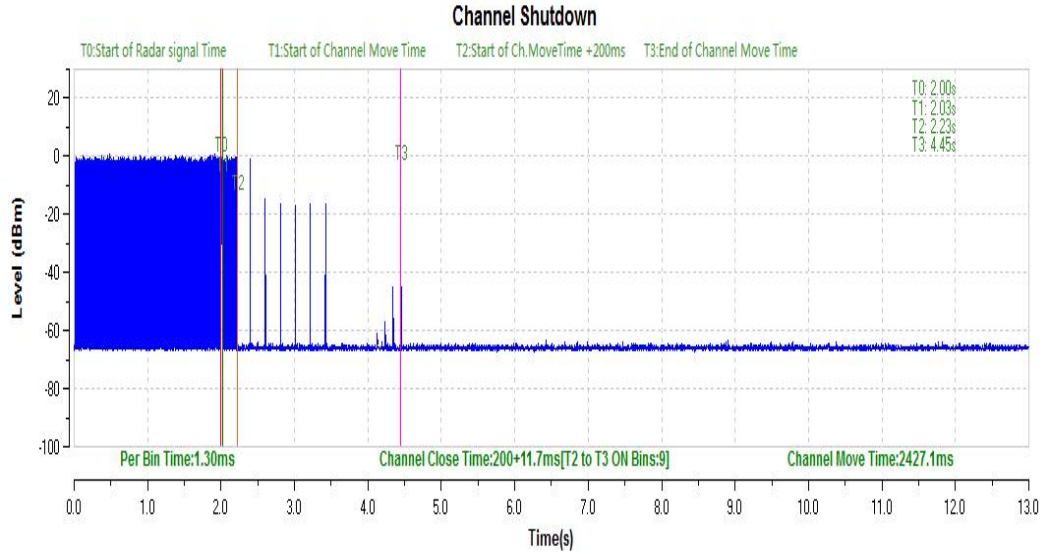


Test Data

IEEE 802.11ax

Channel 50 / 5250 MHz

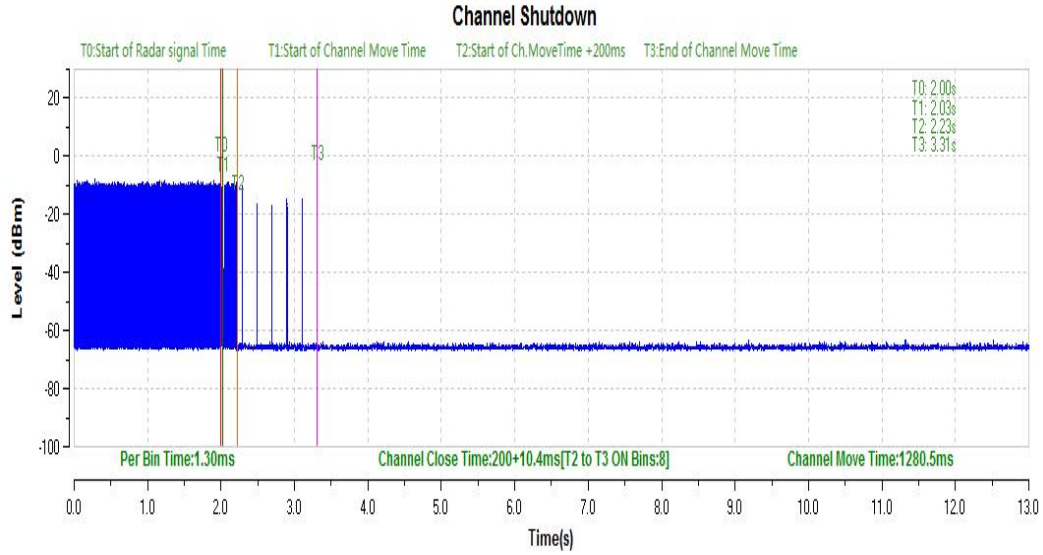
Channel Move Time	Limit
2.623s	10s
Channel Close Time	Limit
12.5ms	60ms



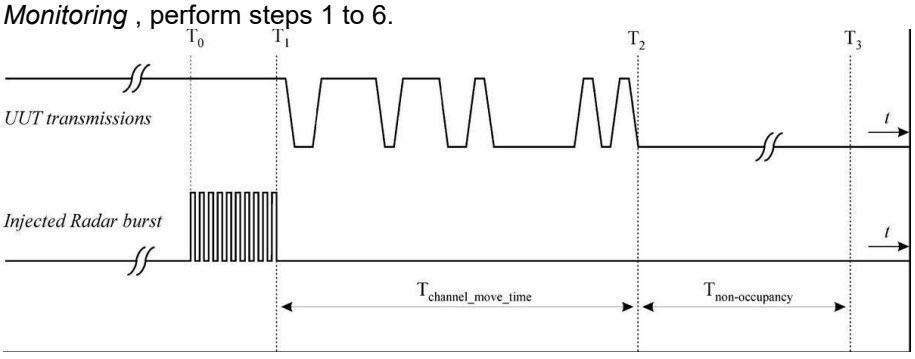
IEEE 802.11ax

Channel 114 / 5570 MHz

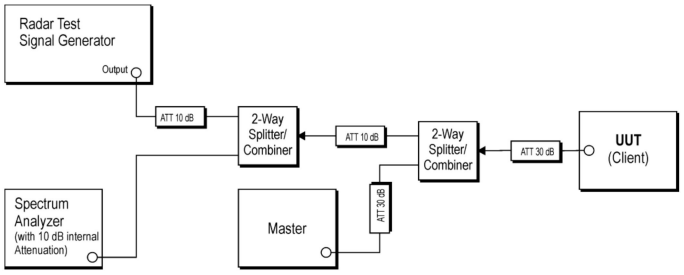
Channel Move Time	Limit
1.161s	10s
Channel Close Time	Limit
11.41ms	60ms



5.4 Non-Occupancy Period Test

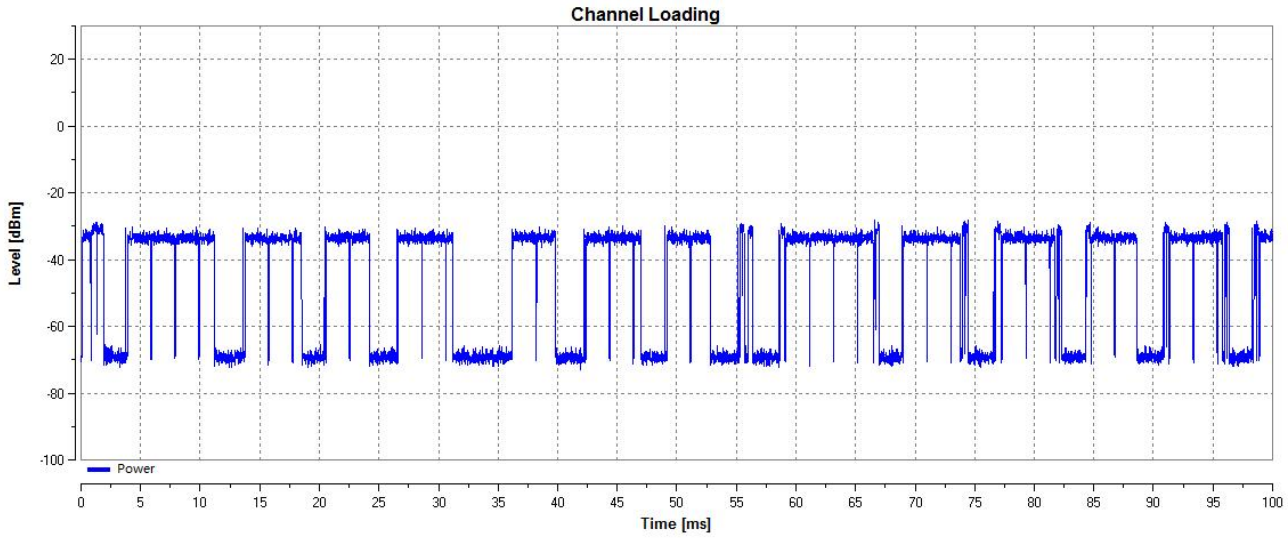
Test Requirement:	47 CFR Part 15.407(h)(2)(iv)
Test Limit:	A channel that has been flagged as containing a radar system, either by a channel availability check or in-service monitoring, is subject to a non-occupancy period of at least 30 minutes. The non-occupancy period starts at the time when the radar system is detected.
Test Method:	KDB 905462 D02, Clause 7.8.3
Procedure:	The steps below define the procedure to determine the above-mentioned parameters when a radar *Burst* with a level equal to the *DFS Detection Threshold* + 1dB is generated on the *Operating Channel* of the U-NII device *(In- Service Monitoring).* 1. One frequency will be chosen from the *Operating Channels* of the UUT within the 5250-5350 MHz or 5470-5725 MHz bands. For 802.11 devices, the test frequency must contain control signals. This can be verified by disabling channel loading and monitoring the spectrum analyzer. If no control signals are detected, another frequency must be selected within the emission bandwidth where control signals are detected. 2. In case the UUT is a U-NII device operating as a *Client Device* (with or without DFS), a U-NII device operating as a *Master Device* will be used to allow the UUT (Client device) to *Associate* with the *Master Device* . In case the UUT is a *Master Device* , a U-NII device operating as a *Client Device* will be used and it is assumed that the Client will *Associate* with the UUT (Master). In both cases for conducted tests, the *Radar Waveform* generator will be connected to the *Master Device* . For radiated tests, the emissions of the *Radar Waveform* generator will be directed towards the *Master Device* . If the *Master Device* has antenna gain, the main beam of the antenna will be directed toward the radar emitter. Vertical polarization is used for testing. 3. Stream the channel loading test file from the *Master Device* to the *Client Device* on the test *Channel* for the entire period of the test. 4. At time T0 the *Radar Waveform* generator sends a *Burst* of pulses for one of the Radar Type 0 in **Table 5** at levels defined in **Table 3** , on the *Operating Channel* . An additional 1 dB is added to the radar test signal to ensure it is at or above the *DFS Detection Threshold* , accounting for equipment variations/errors. 5. Observe the transmissions of the UUT at the end of the radar *Burst* on the *Operating Channel* for duration greater than 10 seconds. Measure and record the transmissions from the UUT during the observation time (*Channel Move Time)* . Measure and record the *Channel Move Time* and *Channel Closing Transmission Time* if radar detection occurs. **Figure 17** illustrates *Channel Closing Transmission Time.* 6. When operating as a *Master Device* , monitor the UUT for more than 30 minutes following instant T2 to verify that the UUT does not resume any transmissions on this *Channel* . Perform this test once and record the measurement result. 7. In case the UUT is a U-NII device operating as a *Client Device* with *In-Service Monitoring* , perform steps 1 to 6.  *Figure 17: Example of Channel Closing Transmission Time & Channel Closing Time*

Test Setup Diagram



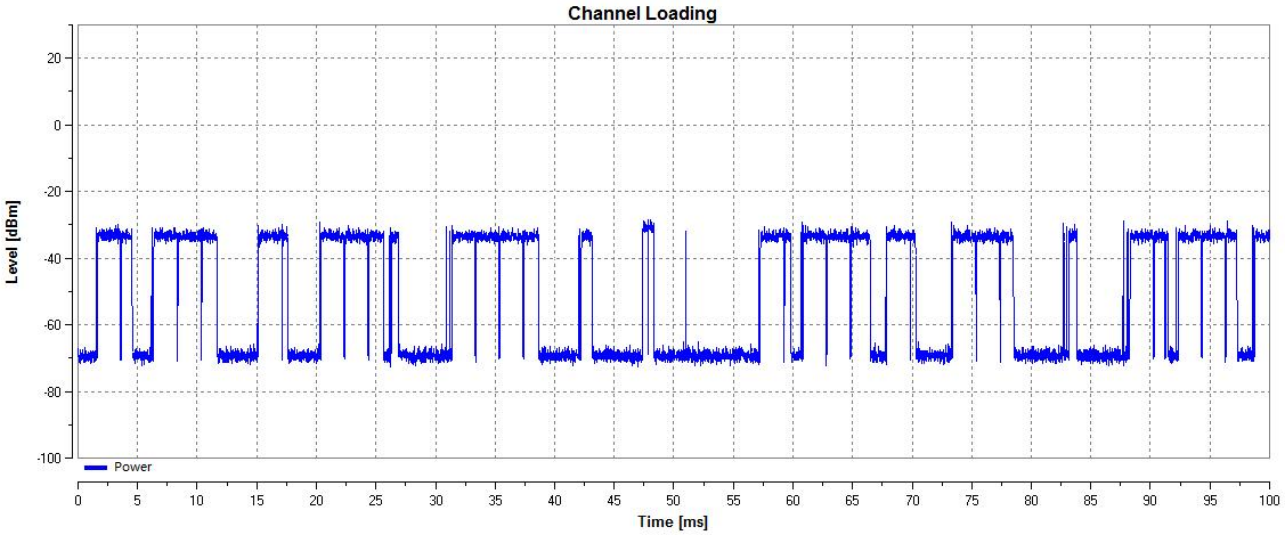
Test Data

IEEE 802.11ax
Channel 50 / 5250 MHz



IEEE 802.11ax

Channel 114 / 5570 MHz



Test Mode	Test Frequency	Packet ratio	Requirement ratio	Test Result
IEEE 802.11ax-VHT160	5250	61.48%	≥17%	Pass
IEEE 802.11ax-VHT160	5570	56.13%	≥17%	Pass
Note: System testing was performed with the designated iperf test file. This file is used by IP and Frame based systems for loading the test channel during the In-service compliance testing of the U-NII device. Packet ratio＝ Time On/ (Time On + off Time).				

5.5 DFS Detection Thresholds

Test Requirement:	KDB 905462 D02, Clause 5.2 Table 3
Test Limit:	Table 3: DFS Detection Thresholds for Master Devices and Client Devices with Radar Detection

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

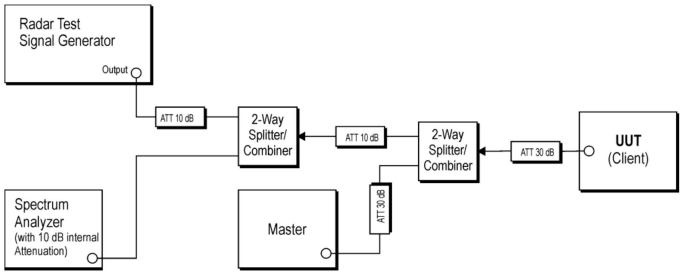
Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP ≥ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm
Note 1: This is the level at the input of the receiver assuming a 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.	

Test Method:	KDB 905462 D02, Clause 7.4.1.1
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 TH+ 0dBi +1dB 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 TH + 0dBi +1dB = -63dBm. Capture the spectrum analyzer plots on short pulse radar waveform. Note: TH=-64 dBm or -62 dBm

E.U.T. Operation

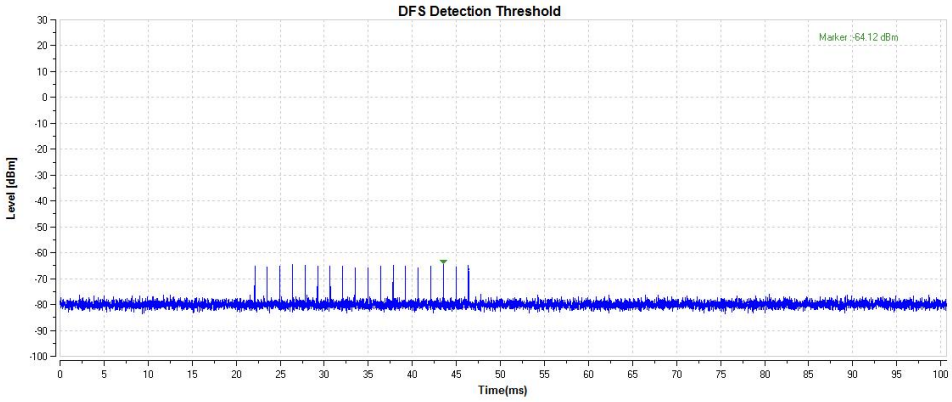
Operating Environment:					
Temperature :	22.3 °C	Humidity:	55.7 %	Atmospheric Pressure:	101.5 kPa
Pre test mode:	TX mode				
Final test mode:	TX mode				

Test Setup Diagram



Test Data

Radar Type 0



Trial List Table - FCC-13-22

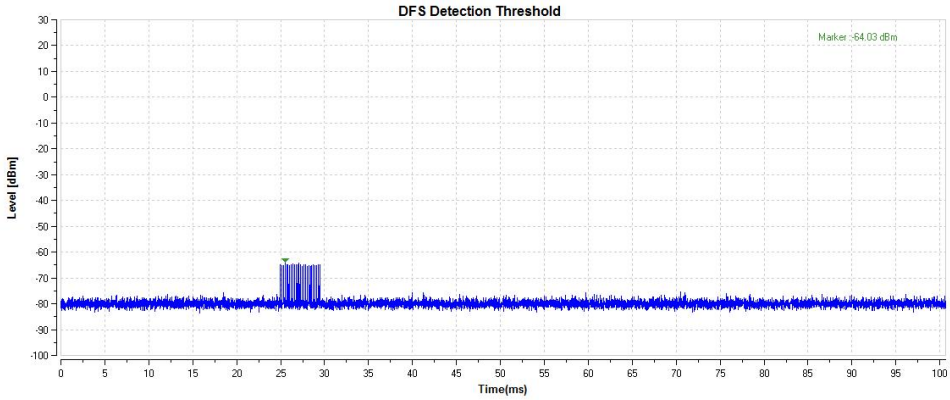
Save | Load | Trigger | Download All

Sample Rate 10 MHz

Trial List

	Trial Id	Radar Type	Pulse Width (us)	PRI (us)	Number of Pulses	Waveform Length (us)
Download	0	Type 0	1.0	1428.0	18	25704.0
Download	1	Type 0	1.0	1428.0	18	25704.0
Download	2	Type 0	1.0	1428.0	18	25704.0
Download	3	Type 0	1.0	1428.0	18	25704.0
Download	4	Type 0	1.0	1428.0	18	25704.0
Download	5	Type 0	1.0	1428.0	18	25704.0
Download	6	Type 0	1.0	1428.0	18	25704.0
Download	7	Type 0	1.0	1428.0	18	25704.0
Download	8	Type 0	1.0	1428.0	18	25704.0
Download	9	Type 0	1.0	1428.0	18	25704.0
Download	10	Type 0	1.0	1428.0	18	25704.0
Download	11	Type 0	1.0	1428.0	18	25704.0
Download	12	Type 0	1.0	1428.0	18	25704.0
Download	13	Type 0	1.0	1428.0	18	25704.0
Download	14	Type 0	1.0	1428.0	18	25704.0
Download	15	Type 0	1.0	1428.0	18	25704.0
Download	16	Type 0	1.0	1428.0	18	25704.0
Download	17	Type 0	1.0	1428.0	18	25704.0
Download	18	Type 0	1.0	1428.0	18	25704.0
Download	19	Type 0	1.0	1428.0	18	25704.0
Download	20	Type 0	1.0	1428.0	18	25704.0
Download	21	Type 0	1.0	1428.0	18	25704.0
Download	22	Type 0	1.0	1428.0	18	25704.0
Download	23	Type 0	1.0	1428.0	18	25704.0
Download	24	Type 0	1.0	1428.0	18	25704.0
Download	25	Type 0	1.0	1428.0	18	25704.0
Download	26	Type 0	1.0	1428.0	18	25704.0
Download	27	Type 0	1.0	1428.0	18	25704.0
Download	28	Type 0	1.0	1428.0	18	25704.0

Radar Type 2



Trial List Table - FCC-13-22

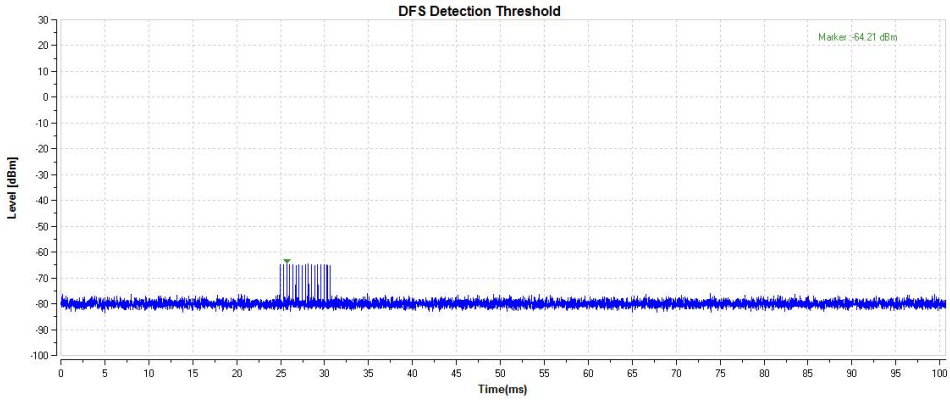
Save Load Trigger Download All

Sample Rate 10 MHz

Trial List

	Trial Id	Radar Type	Pulse Width (us)	PRI (us)	Number of Pulses	Waveform Length (us)
Download	0	Type 2	3.2	179.0	26	4654.0
Download	1	Type 2	1.1	207.0	23	4761.0
Download	2	Type 2	2.1	230.0	24	5520.0
Download	3	Type 2	4.8	200.0	29	5800.0
Download	4	Type 2	3.9	214.0	28	5992.0
Download	5	Type 2	2.9	222.0	26	5772.0
Download	6	Type 2	3.2	204.0	26	5304.0
Download	7	Type 2	2.5	192.0	25	4800.0
Download	8	Type 2	3.1	164.0	26	4264.0
Download	9	Type 2	1.2	156.0	23	3588.0
Download	10	Type 2	3.9	210.0	27	5670.0
Download	11	Type 2	4.6	201.0	29	5829.0
Download	12	Type 2	3.2	162.0	26	4212.0
Download	13	Type 2	2.2	197.0	25	4925.0
Download	14	Type 2	4.5	163.0	29	4727.0
Download	15	Type 2	3.0	203.0	26	5278.0
Download	16	Type 2	5.0	168.0	29	4872.0
Download	17	Type 2	2.4	217.0	25	5425.0
Download	18	Type 2	2.9	191.0	26	4966.0
Download	19	Type 2	2.3	166.0	25	4150.0
Download	20	Type 2	3.7	150.0	27	4050.0
Download	21	Type 2	2.2	176.0	25	4400.0
Download	22	Type 2	4.9	195.0	29	5655.0
Download	23	Type 2	2.9	202.0	26	5252.0
Download	24	Type 2	2.5	178.0	25	4450.0
Download	25	Type 2	1.1	206.0	23	4738.0
Download	26	Type 2	3.8	155.0	27	4185.0
Download	27	Type 2	4.7	157.0	29	4553.0
Download	28	Type 2	2.4	224.0	25	5600.0

Radar Type 3



Trial List Table - FCC-13-22

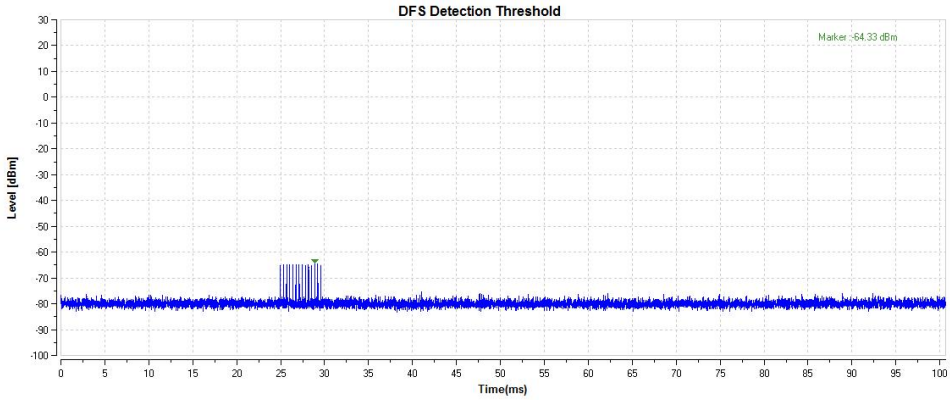
Save | Load | Trigger | Download All

Sample Rate 10 MHz

Trial List

	Trial Id	Radar Type	Pulse Width (us)	PRI (us)	Number of Pulses	Waveform Length (us)
Download	0	Type 3	8.2	355.0	17	6035.0
Download	1	Type 3	6.1	487.0	16	7792.0
Download	2	Type 3	7.1	344.0	16	5504.0
Download	3	Type 3	9.8	288.0	18	5184.0
Download	4	Type 3	8.9	230.0	18	4140.0
Download	5	Type 3	7.9	432.0	17	7344.0
Download	6	Type 3	8.2	207.0	17	3519.0
Download	7	Type 3	7.5	443.0	17	7531.0
Download	8	Type 3	8.1	439.0	17	7463.0
Download	9	Type 3	6.2	223.0	16	3568.0
Download	10	Type 3	8.9	208.0	18	3744.0
Download	11	Type 3	9.6	463.0	18	8334.0
Download	12	Type 3	8.2	441.0	17	7497.0
Download	13	Type 3	7.2	323.0	16	5168.0
Download	14	Type 3	9.5	297.0	18	5346.0
Download	15	Type 3	8.0	412.0	17	7004.0
Download	16	Type 3	10.0	324.0	18	5832.0
Download	17	Type 3	7.4	271.0	17	4607.0
Download	18	Type 3	7.9	349.0	17	5933.0
Download	19	Type 3	7.3	409.0	16	6544.0
Download	20	Type 3	8.7	373.0	18	6714.0
Download	21	Type 3	7.2	254.0	16	4064.0
Download	22	Type 3	9.9	274.0	18	4932.0
Download	23	Type 3	7.9	278.0	17	4726.0
Download	24	Type 3	7.5	317.0	17	5389.0
Download	25	Type 3	6.1	260.0	16	4160.0
Download	26	Type 3	8.8	211.0	18	3798.0
Download	27	Type 3	9.7	272.0	18	4896.0
Download	28	Type 3	7.4	264.0	17	4488.0

Radar Type 4



Trial List Table - FCC-13-22

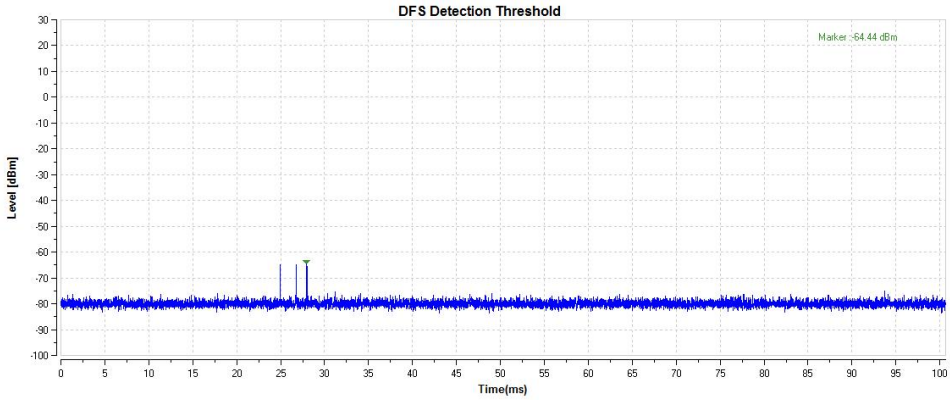
Save Load Trigger Download All

Sample Rate 10 MHz

Trial List

	Trial Id	Radar Type	Pulse Width (us)	PRI (us)	Number of Pulses	Waveform Length (us)
Download	0	Type 4	16.0	355.0	14	4970.0
Download	1	Type 4	11.3	487.0	12	5844.0
Download	2	Type 4	13.5	344.0	13	4472.0
Download	3	Type 4	19.4	288.0	16	4608.0
Download	4	Type 4	17.5	230.0	15	3450.0
Download	5	Type 4	15.3	432.0	14	6048.0
Download	6	Type 4	15.9	207.0	14	2898.0
Download	7	Type 4	14.3	443.0	13	5759.0
Download	8	Type 4	15.8	439.0	14	6146.0
Download	9	Type 4	11.5	223.0	12	2676.0
Download	10	Type 4	17.4	208.0	15	3120.0
Download	11	Type 4	19.0	463.0	16	7408.0
Download	12	Type 4	16.0	441.0	14	6174.0
Download	13	Type 4	13.8	323.0	13	4199.0
Download	14	Type 4	18.9	297.0	16	4752.0
Download	15	Type 4	15.5	412.0	14	5768.0
Download	16	Type 4	19.9	324.0	16	5184.0
Download	17	Type 4	14.1	271.0	13	3523.0
Download	18	Type 4	15.2	349.0	14	4886.0
Download	19	Type 4	13.8	409.0	13	5317.0
Download	20	Type 4	17.1	373.0	15	5595.0
Download	21	Type 4	13.8	254.0	13	3302.0
Download	22	Type 4	19.8	274.0	16	4384.0
Download	23	Type 4	15.3	278.0	14	3892.0
Download	24	Type 4	14.5	317.0	13	4121.0
Download	25	Type 4	11.3	260.0	12	3120.0
Download	26	Type 4	17.3	211.0	15	3165.0
Download	27	Type 4	19.2	272.0	16	4352.0
Download	28	Type 4	14.2	264.0	13	3432.0

Radar Type 5



Trial List Table - FCC-13-22

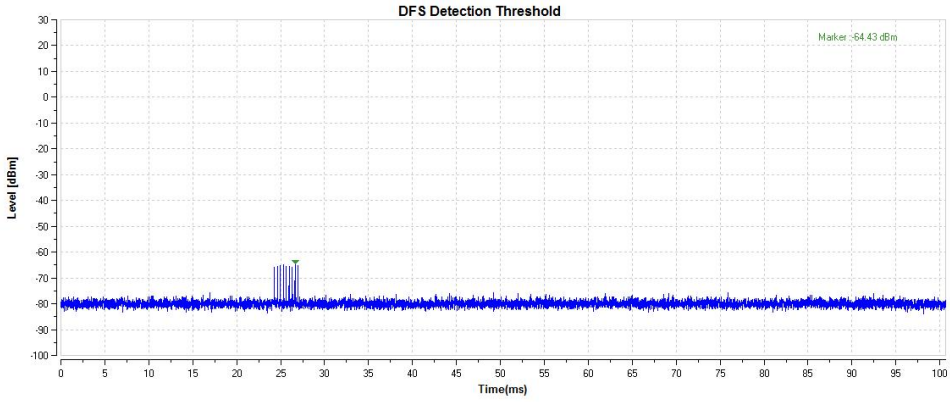
Save | Load | Trigger | Download All

Sample Rate: 100 MHz | UUT Channel Center Frequency: 5.5 GHz | Radar Detection Bandwidth: 5 MHz

Trial List

	Trial Id	Radar Type	Number of Bursts	Burst Period (s)	Waveform Length (s)	Center Frequency (GHz)		
Download	0	Type 5	15	0.8000000	12.0000000	5.500000000		
Download	1	Type 5	8	1.5000000	12.0000000	5.500000000		
Download	2	Type 5	11	1.0909091	12.0000000	5.500000000		
Download	3	Type 5	20	0.6000000	12.0000000	5.500000000		
Download	4	Type 5	17	0.7058824	12.0000000	5.500000000		
Download	5	Type 5	14	0.8571429	12.0000000	5.500000000		
Download	6	Type 5	15	0.8000000	12.0000000	5.500000000		
Download	7	Type 5	12	1.0000000	12.0000000	5.500000000		
Download	8	Type 5	14	0.8571429	12.0000000	5.500000000		
Download	9	Type 5	8	1.5000000	12.0000000	5.500000000		
Download	10	Type 5	17	0.7058824	12.0000000	5.503900000		
Download	11	Type 5	19	0.6315789	12.0000000	5.505100000		
Download	12	Type 5	15	0.8000000	12.0000000	5.502700000		
Download	13	Type 5	12	1.0000000	12.0000000	5.501500000		
Download	14	Type 5	19	0.6315789	12.0000000	5.504700000		
Download	15	Type 5	14	0.8571429	12.0000000	5.502300000		
Download	16	Type 5	20	0.6000000	12.0000000	5.505500000		
Download	17	Type 5	12	1.0000000	12.0000000	5.501500000		
Download	18	Type 5	14	0.8571429	12.0000000	5.502300000		
Download	19	Type 5	12	1.0000000	12.0000000	5.501500000		
Download	20	Type 5	16	0.7500000	12.0000000	5.496500000		
Download	21	Type 5	12	1.0000000	12.0000000	5.498900000		
Download	22	Type 5	20	0.6000000	12.0000000	5.494500000		
Download	23	Type 5	14	0.8571429	12.0000000	5.497700000		
Download	24	Type 5	13	0.9230769	12.0000000	5.498100000		
Download	25	Type 5	8	1.5000000	12.0000000	5.500500000		
Download	26	Type 5	17	0.7058824	12.0000000	5.496100000		
Download	27	Type 5	19	0.6315789	12.0000000	5.494900000		
Download	28	Type 5	12	1.0000000	12.0000000	5.498500000		

Radar Type 6



Trial List Table - FCC-13-22

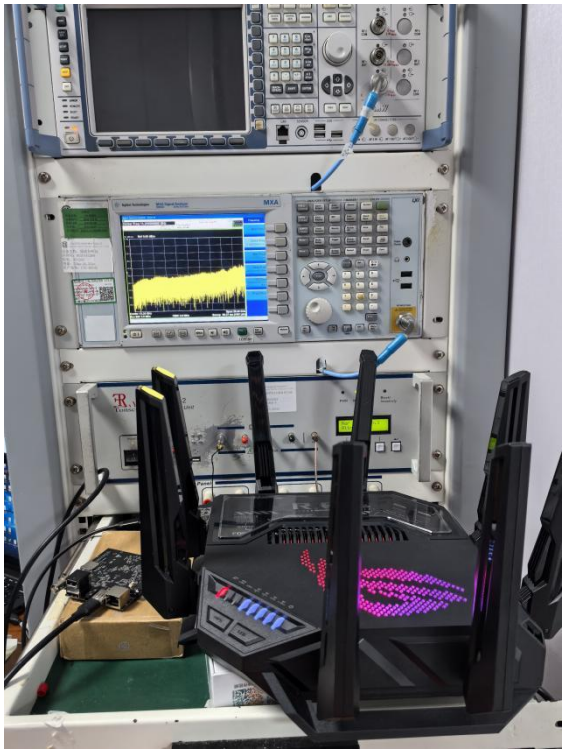
Save | Load | Trigger | Download All

Sample Rate 200 MHz Center Frequency 5500 MHz Channel Bandwidth 160 MHz

Trial List

		Trial Id	Radar Type	Pulse Width (us)	PRI (us)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (ms)	Visible Frequency Number
⊞	Download	0	Type 6	1.0	333.3	9	0.3333	300.0000000	32
⊞	Download	1	Type 6	1.0	333.3	9	0.3333	300.0000000	27
⊞	Download	2	Type 6	1.0	333.3	9	0.3333	300.0000000	25
⊞	Download	3	Type 6	1.0	333.3	9	0.3333	300.0000000	33
⊞	Download	4	Type 6	1.0	333.3	9	0.3333	300.0000000	37
⊞	Download	5	Type 6	1.0	333.3	9	0.3333	300.0000000	30
⊞	Download	6	Type 6	1.0	333.3	9	0.3333	300.0000000	33
⊞	Download	7	Type 6	1.0	333.3	9	0.3333	300.0000000	27
⊞	Download	8	Type 6	1.0	333.3	9	0.3333	300.0000000	33
⊞	Download	9	Type 6	1.0	333.3	9	0.3333	300.0000000	30
⊞	Download	10	Type 6	1.0	333.3	9	0.3333	300.0000000	37
⊞	Download	11	Type 6	1.0	333.3	9	0.3333	300.0000000	36
⊞	Download	12	Type 6	1.0	333.3	9	0.3333	300.0000000	38
⊞	Download	13	Type 6	1.0	333.3	9	0.3333	300.0000000	35
⊞	Download	14	Type 6	1.0	333.3	9	0.3333	300.0000000	28
⊞	Download	15	Type 6	1.0	333.3	9	0.3333	300.0000000	37
⊞	Download	16	Type 6	1.0	333.3	9	0.3333	300.0000000	35
⊞	Download	17	Type 6	1.0	333.3	9	0.3333	300.0000000	37
⊞	Download	18	Type 6	1.0	333.3	9	0.3333	300.0000000	27
⊞	Download	19	Type 6	1.0	333.3	9	0.3333	300.0000000	34
⊞	Download	20	Type 6	1.0	333.3	9	0.3333	300.0000000	35
⊞	Download	21	Type 6	1.0	333.3	9	0.3333	300.0000000	37
⊞	Download	22	Type 6	1.0	333.3	9	0.3333	300.0000000	41
⊞	Download	23	Type 6	1.0	333.3	9	0.3333	300.0000000	36
⊞	Download	24	Type 6	1.0	333.3	9	0.3333	300.0000000	29
⊞	Download	25	Type 6	1.0	333.3	9	0.3333	300.0000000	32
⊞	Download	26	Type 6	1.0	333.3	9	0.3333	300.0000000	30
⊞	Download	27	Type 6	1.0	333.3	9	0.3333	300.0000000	31

6. TEST SETUP PHOTOS



7. EXTERNAL AND INTERNAL PHOTOS

7.1. External Photos

Please Refer Report to CISRR2408292150601

7.2. Internal photos

Please Refer Report to CISRR2408292150601

------End of the report------