FCC Test Report

Test report

On Behalf of

MICRO COMPUTER (HK) TECH LIMITED

For

Mini PC

Model No.: X1 Pro-370, X1 Pro-365, X1 Pro-********: where* = "0-9", "A-Z", "-", "space"**

FCC ID: 2A49R-X1PRO

Prepared For : **MICRO COMPUTER (HK) TECH LIMITED**

RM 18, 28/F, Shui On Centre, 6-8 Harbour Road, Waterfront, Wan Chai, HK, HONG KONG, China

Prepared By : **Shenzhen HUAK Testing Technology Co., Ltd.**

1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Date of Test: **Jan. 10, 2025 ~ Feb. 18, 2025**

Date of Report: **Feb. 18, 2025**

Report Number: **HK2501100235-7E**

Test Result Certification

Applicant's name :	MICRO COMPUTER (HK) TECH LIMITED
Address :	RM 18, 28/F, Shui On Centre, 6-8 Harbour Road, Waterfront, Wan Chai, HK, HONG KONG, China
Manufacturer's Name :	MICRO COMPUTER (HK) TECH LIMITED
Address :	RM 18, 28/F, Shui On Centre, 6-8 Harbour Road, Waterfront, Wan Chai, HK, HONG KONG, China
Product description	
Trade Mark :	N/A
Product name :	Mini PC
Model No :	X1 Pro-370, X1 Pro-365, X1 Pro-**********: where* = "0-9", "A-Z", "-", "space"
Standards :	FCC 47 CFR Part 15 Subpart E

Date of Test :	
Date (s) of performance of tests :	Jan. 10, 2025 ~ Feb. 18, 2025
Date of Issue :	Feb. 18, 2025
Test Result :	**PASS**

Testing Engineer : Len Liao

(Len Liao)

Technical Manager : Sliver Wan

(Sliver Wan)

Authorized Signatory : Jason Zhou

(Jason Zhou)

Table of Contents

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** Modified History **

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	Feb. 18, 2025	Jason Zhou

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1 General Description

1.1 Applicant

MICRO COMPUTER (HK) TECH LIMITED

RM 18, 28/F, Shui On Centre, 6-8 Harbour Road, Waterfront, Wan Chai, HK, HONG KONG, China

1.2 Manufacturer

MICRO COMPUTER (HK) TECH LIMITED

RM 18, 28/F, Shui On Centre, 6-8 Harbour Road, Waterfront, Wan Chai, HK, HONG KONG, China

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	Mini PC
Model Name	X1 Pro-370
Series Models	X1 Pro-365, X1 Pro-**********: where* = “0-9”, “A-Z”, “-”, “space”
Model Difference	The difference between each model is only due to the different sales area and the model name is different, the other circuit principle, safety structure and key components are the same, the difference does not affect the safety and electromagnetic compatibility performance of the product. Test sample model: X1 Pro-370.
Trade Mark	N/A
FCC ID	2A49R-X1PRO
EUT supports Radios application	WLAN 11a/n/ac VHT20/VHT40/VHT80/ HT160 WLAN 11 ax HE20/HE40/HE80 /HE160 WLAN 11 be EHT 20/ EHT 40/ EHT 80
HW Version	V1.0
SW Version	V1.0
EUT Stage	Production Unit

Remark: 1. Above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

2. This device is support TPC.

3. Auxiliary device of master is a Dual band wireless router, It is CMIIT ID:24J71717R003.

4. We use software to control the auxiliary equipment and EUT transmit the same channel.

1.4 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
DFS Function	**Master**
Tx/Rx Channel Frequency Range	Band I+ II : IEEE 802.11a/n/ac(HT20)/ax(HE20)/be(EHT20): 5.180GHz-5.240GHz IEEE 802.11n/ac(HT40)/ax(HE40)/be(EHT40): 5.190GHz-5.230GHz IEEE 802.11ac(HT80)/ax(HE80)/be(EHT80): 5.210GHz IEEE 802.11a/n/ac(HT20)/ax(HE20): 5.260GHz-5.320GHz IEEE 802.11n/ac(HT40)/ax(HE40): 5.270GHz-5.310GHz IEEE 802.11ac(HT80)/ax(HE80): 5.290GHz IEEE 802.11ac(HT160)/ax(HE160): 5.250GHz Band III: IEEE 802.11a/n/ac(HT20)/ax(HE20): 5.500GHz-5.700GHz IEEE 802.11n/ac(HT40)/ax(HE40): 5.510GHz-5.670GHz IEEE 802.11ac(HT80)/ax(HE80): 5.530GHz-5.610GHz IEEE 802.11ac(HT160)/ax(HE160): 5.570GHz IEEE 802.11ac(HT80)/ax(HE80) 5.530GHz-5.610GHz IEEE 802.11ac(HT160)/ax(HE160) 5.570GHz
Type of Modulation	64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode only 1024QAM for OFDMA in 11ax mode only 4096QAM for OFDMA in 11be mode only

IEEE802.11a mode:

Channel (5180MHz), Channel (5200MHz), Channel (5240MHz), Channel (5260MHz), Channel (5280MHz), Channel (5320MHz), Channel (5500MHz), Channel (5580MHz)and Channel (5700MHz) with 6Mbps data rate were chosen for full testing.

IEEE802.11n/ac(HT20)/ax(HE20)/be(EHT20) mode:

Channel (5180MHz), Channel (5200MHz), and Channel (5240MHz) with 6Mbps data rate were chosen for full testing.

IEEE802.11n/ac(HT20)/ax(HE20) mode:

Channel (5260MHz), Channel (5280MHz), Channel (5320MHz), Channel (5500MHz), Channel (5580MHz) and Channel (5700MHz) with 6Mbps data rate were chosen for full testing.

IEEE802.11n/ac(HT40)/ax(HE40)/be(EHT40) mode:

Channel (5190MHz) and Channel (5230MHz) with 6Mbps data rate were chosen for full testing.

IEEE802.11n/ac(HT40)/ax(HE40) mode:
Channel (5270MHz), Channel (5310MHz), Channel (5510MHz), Channel (5550MHz) and Channel (5670MHz) with 6Mbps data rate were chosen for full testing.

IEEE802.11ac(HT80)/ax(HE80)/be(EHT80) mode:

Channel (5210MHz) with MCS0 data rate were chosen for full testing.

IEEE802.11ac(HT80)/ax(HE80) mode:
Channel (5290MHz), Channel (5530MHz), Channel (5610MHz) with MCS0 data rate were chosen for full testing.

IEEE802.11ac(HT160)/ax(HE160) mode:

Channel (5250MHz), Channel (5570MHz) with MCS0 data rate were chosen for full testing.

1.5 Testing Site

Test Site	**Shenzhen HUAK Testing Technology Co., Ltd.**
Test Site Location	**1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China**

1.6 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

☒ FCC Part 15 Subpart E

☒ FCC KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02

☒ FCC KDB 905462 D03 UNII Clients Without Radar Detection New Rules v01r02

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2 Requirements and Parameters for DFS Test

2.1 Applicability of DFS Requirements

EUT is client and operates as client without radar detection function.

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

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar
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	Client Without Radar Detection	Client With Radar
DFS Detection Threshold	Yes	Not required	Yes
Channel Closing Transmission Time	Yes	Yes	Yes
Channel Move Time	Yes	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required	Yes
Client Beacon Test	N/A	Yes	Yes

Additional requirements for devices with multiple bandwidth modes	Operational Mode	
	Master or Client With	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 (Section 7.8.4) 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.

2.2 Interference Threshold values, Master or Client incorporating In-Service Monitoring

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. **Note 3:** EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.	

The radar *Detection Threshold*, lowest antenna gain is the parameter of Interference *radar DFS detection threshold*, The Interference *Detection Threshold* is the *(-62dBm) + (0)* [dBi]+ 1 dB= -61 dBm.

2.3 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 99% power bandwidth See Note 3.

Note 1: The instant that the *Channel Move Time* and the *Channel Closing Transmission Time* begins is as follows:

- For the Short pulse radar Test Signals this instant is the end of the *Burst*.
- For the Frequency Hopping radar Test Signal, this instant is the end of the last radar *Burst* generated.
- For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission.

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 to facilitate *Channel* changes (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 is used and for each frequency step the minimum percentage of detection is 90%. Measurements are performed with no data traffic.

2.4 Short Pulse Radar Test Waveforms

As the EUT is a Client Device with no Radar Detection, only one type radar pulse is required for the testing. Radar Pulse type 0 was used in the evaluation of the Client device for the purpose of measuring the Channel Move Time and the Channel Closing Transmission Time.

Radar Type	Width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A Test B	$\text{Roundup}\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{\text{PRI}_{\mu\text{sec}}}\right)\right\}$	60%	30
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

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. For short pulse radar type 1, the same waveform is used a minimum of 30 times. 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.

The aggregate is the average of the percentage of successful detections of short pulse radar types 1-4.

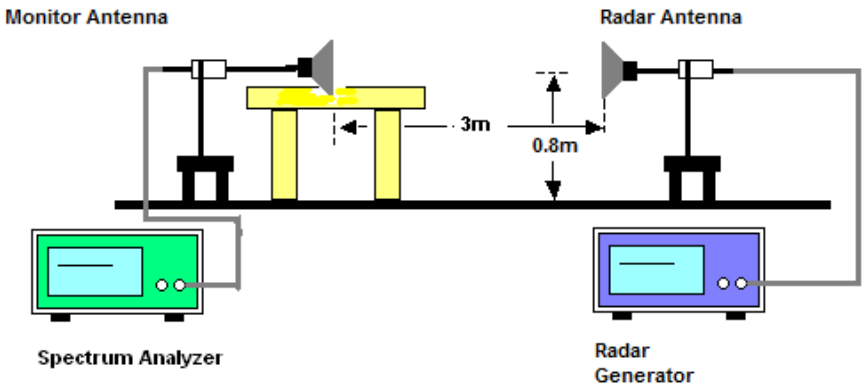
3 Calibration Setup and DFS Test Results

3.1 Calibration of Radar Waveform

3.1.1 Radar Waveform Calibration Procedure

The Interference **Radar Detection Threshold Level** is *(-62dBm) + (0)* [dBi]+ 1 dB= -61dBm that had been taken into account the output power range and antenna gain. The following equipment setup was used to calibrate the radiated 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 span (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 to measure the type 0 radar waveform. The spectrum analyzer had offset -8.26dB to compensate receiving horn antenna gain 11.80dBi and RF cable loss 3.54dB. The vector signal generator amplitude was set so that the power level measured at the spectrum analyzer was *(-62dBm) + (0)* [dBi]+ 1 dB= -61 dBm. Capture the spectrum analyzer plots on short pulse radar waveform.

3.1.2 Radiated Calibration Setup



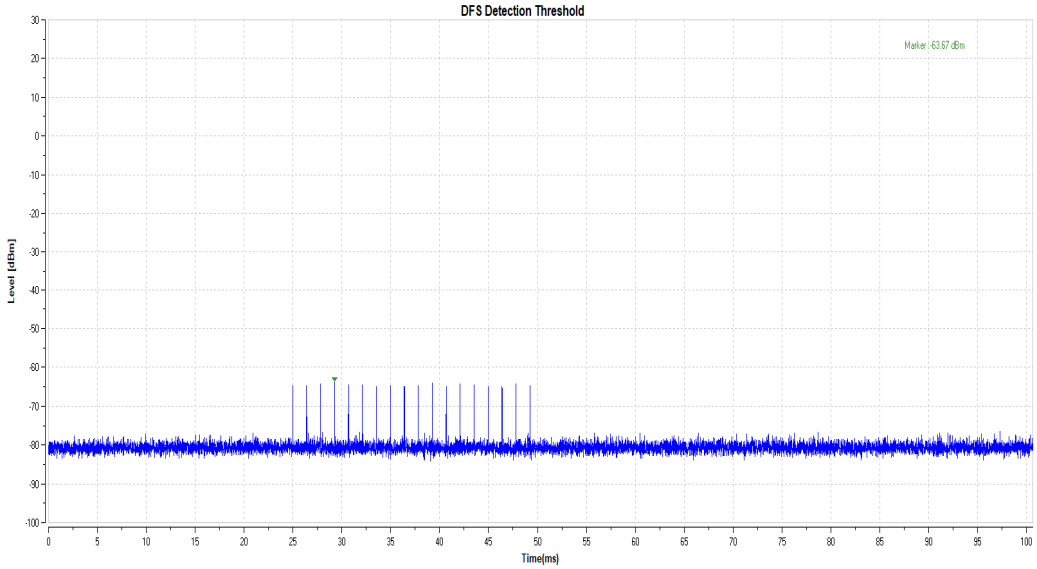
3.1.3 Calibration Deviation

There is no deviation with the original standard.

3.1.4 Radar Waveform Calibration Result

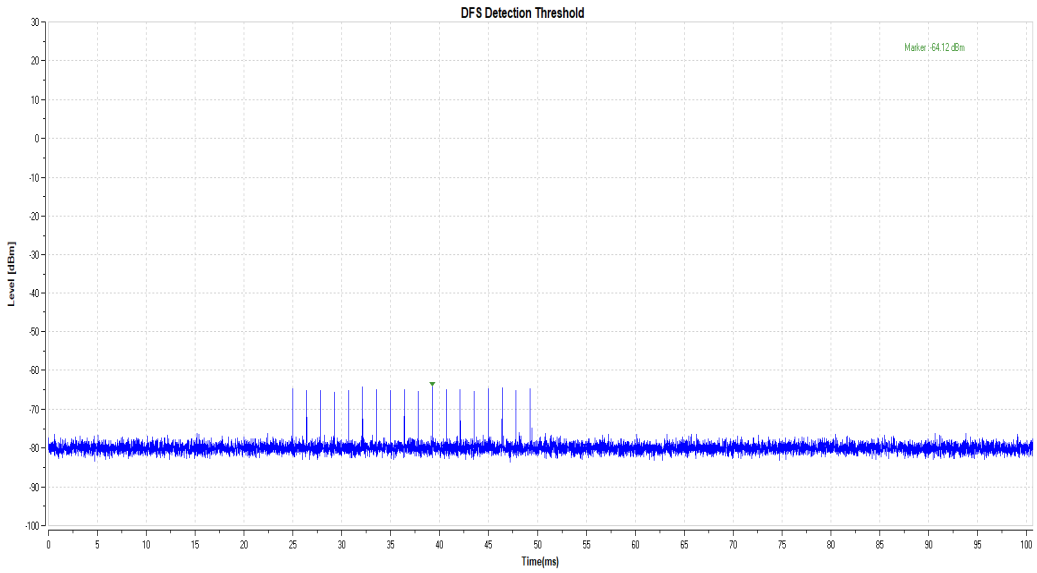
<20MHz / 5260 MHz> In-Service Monitoring

Radar / DFS detection threshold level and the burst of pulses on the Channel frequency



<20MHz / 5500 MHz> In-Service Monitoring

Radar / DFS detection threshold level and the burst of pulses on the Channel frequency



Note: All the test modes completed for test. The worst case of Ant 2; the test data of this mode was reported

3.2 In-Service Monitoring: Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period

3.2.1 Limit of In-Service Monitoring

The EUT has In-Service Monitoring function to continuously monitor the radar signals, If radar is detected, it must leave the channel (Shutdown). The Channel Move Time to cease all transmissions on the current Channel upon detection of a Radar Waveform above the DFS Detection Threshold within 10 sec. The total duration of *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 *Channel* changes (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.

Non-Occupancy Period time is 30 minute during which a Channel will not be utilized after a Radar Waveform is detected on that Channel. The non-associated Client Beacon Test is during the 30 minutes observation time. The EUT should not make any transmissions in the DFS band after EUT power up.

3.2.2 Test Procedures

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 1428 us PRI is used for the testing.

2.The vector signal generator is adjusted to provide the radar burst (18 pulses) at a level of approximately -62dBm at the antenna 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.A U-NII device operating as a Client Device will associate with the Master at Channel. The MPEG file "TestFile.mpg" specified by the FCC is streamed from the "file computer" through the Master to the Client Device and played in full motion video using Media Player Classic Ver. 6.4.8.6 in order to properly load the network for the entire period of the test.

5.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. 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 EUT during the observation time (Channel Move Time). One 12 seconds plot is reported for the Short Pulse Radar Types 1. 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.

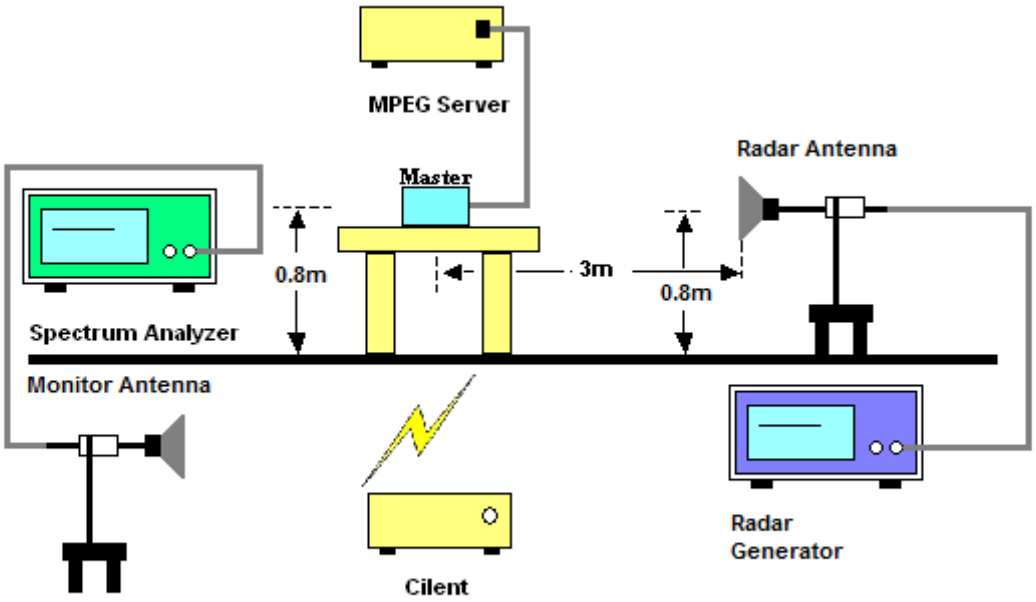
7.Measurement of the aggregate duration of the Channel Closing Transmission Time method.

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 (0.4ms)= S (12000ms) / B (30000)**; where Dwell is the dwell time per spectrum analyzer sampling bin, S is the 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 X Dwell (0.4 ms)**; 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.

8.Measure the EUT for more than 30 minutes following the channel move time to verify that no transmissions or beacons occur on this Channel.

3.2.3 Test Setup

Radiated Test Setup Photo



3.2.4 Test Deviation

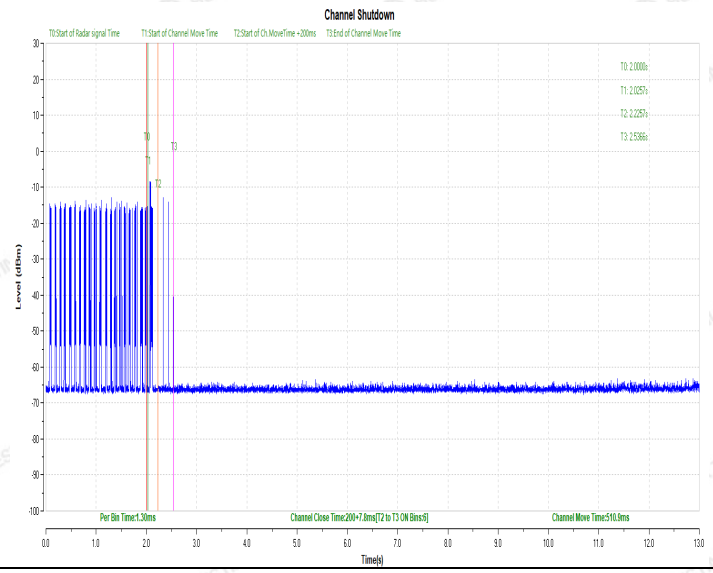
There is no deviation with the original standard.

3.2.5 Result of Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period for Client Beacon Test

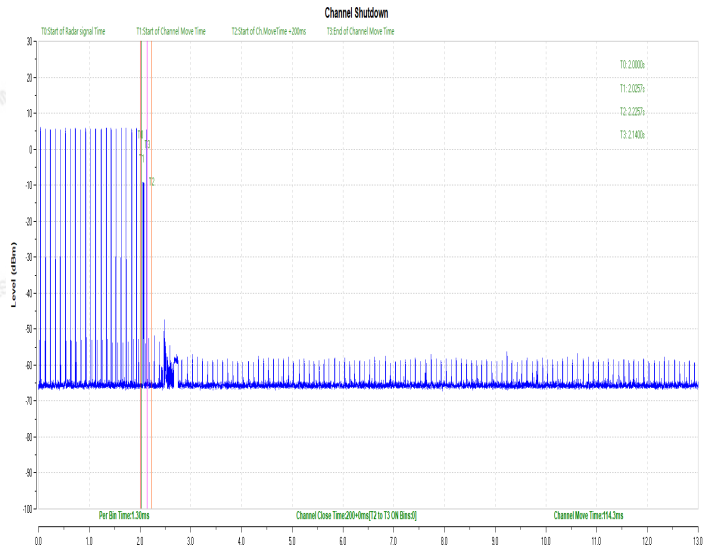
BW / Channel	Test Item	Test Result	Limit	Pass/Fail
20MHz / 5260	Channel Move Time	0.51s	< 10s	Pass
	Channel Closing Transmission Time	207.8ms	< 260ms	Pass
20MHz / 5500	Channel Move Time	0.11s	< 10s	Pass
	Channel Closing Transmission Time	200ms	< 260ms	Pass

3.2.6 Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period for Client Beacon Test Plots

<20MHz / 5260 MHz> In-Service Monitoring



<20MHz / 5500 MHz> In-Service Monitoring



Note: All the test modes completed for test. The worst case of Ant 2; the test data of this mode was repor

4 List of Measuring Equipment

Adaptively & Receiver Blocking						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	Spectrum analyzer	R&S	FSP40	HKE-025	2024/02/20	2025/02/19
2	Wireless Communication Test Set	R&S & DFS	CMU200	HKE-026	2024/02/20	2025/02/19
3	Wireless Communication Test Set	R&S	CMW500	HKE-027	2024/02/20	2025/02/19
4	RF automatic control unit	Tonscend	JS0806-2	HKE-060	2024/02/20	2025/02/19
5	RF test software	Tonscend	JS1120-3 V3.5.39	HKE-083	/	/

---------End of test report---------

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